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Variability of I/M Test Scores over Time

Southwest Research Inst., San Antonio, TX

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16. ABSTRACT

This program involved conducting twice-weekly I/M (Inspection and Maintenance) emission short tests on twenty-five late model gasoline-fueled vehicles over a 15-week time period. All of the twenty-five vehicles (1981 model year or later) were tested once in the morning and again later that same day following a soak period of at least three hours. The vehicles tested in the program were owned by Southwest Research Institute employees and were selected to represent a variety of vehicle types, emission controls, etc. Emission tests were conducted using two Bear Automotive Type 42-925 4-Gas Infrared Analyzers with generic software. Each emission test sequence included a "Test Analyzer Specifications" ("TAS") sequence (i.e., 2500 rpm/idle test with emissions measured in both modes), a vehicle conditioning step utilizing three minutes of engine operation at 2500 ± 300 rpm with the vehicle transmission in neutral, idling in neutral for 15 seconds, and finally a second TAS sequence. The tests were conducted to provide EPA with information regarding:

+ or —

- Variability in short test emission results
- Impact of off-idle no-load preconditioning cycles on short test emissions, and
- Emission differences between a fully-warmed vehicle and a "soaked" vehicle having undergone minimum operation.

Hydrocarbon and carbon monoxide emissions are reported for each vehicle in tabular and graphical form. Hydrocarbons are reported in ppm and carbon monoxide in percent.

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by

Lawrence R. Smith

Southwest Research Institute
6220 Culebra Road
San Antonio, Texas 78284

Contract No. 68-03-4044
Work Assignment B-2

EPA Project Officer: Craig A. Harvey

Prepared for

ENVIRONMENTAL PROTECTION AGENCY
Office of Mobile Source Air Pollution Control
Emission Control Technology Division
2565 Plymouth Road
Ann Arbor, Michigan 48105

September 1988

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FOREWORD

This project was conducted for the U.S. Environmental Protection Agency by the Department of Emissions Research, Southwest Research Institute. The program, authorized by Work Assignment B-2 under Contract 68-03-4044, was initiated August 11, 1987 and completed in March 1988. It was identified within Southwest Research Institute as Project 08-1567-002. The EPA Project Officer for the program was Mr. Craig A. Harvey and the Project Technical Monitor was Mr. Larry Landman, both of the Emission Control Technology Division, Ann Arbor, Michigan. SwRI Project Leader and principal researcher for the project was Dr. Lawrence R. Smith. Mr. Charles T. Hare was Project Manager, and was involved in the initial technical and fiscal negotiations and subsequent major program decisions. Key technical personnel involved at SwRI included: W.C. Olson, D.M. Lovell, K.M. Jack, P.J. Nickoloff, C.E. Grinstead, and S.G. Nino.

ABSTRACT

This program involved conducting twice-weekly I/M (Inspection and Maintenance) emission short tests on twenty-five late model gasoline-fueled vehicles over a 15-week time period. All of the twenty-five vehicles (1981 model year or later) were tested once in the morning and again later that same day following a soak period of at least three hours. The vehicles tested in the program were owned by Southwest Research Institute employees and were selected to represent a variety of vehicle types, emission controls, etc. Emission tests were conducted using two Bear Automotive Type 42-925 4-Gas Infrared Analyzers with generic software. Each emission test sequence included a "Test Analyzer Specifications" ("TAS") sequence (i.e., 2500 rpm/idle test with emissions measured in both modes), a vehicle conditioning step utilizing three minutes of engine operation at 2500 ± 300 rpm with the vehicle transmission in neutral, idling in neutral for 15 seconds, and finally a second TAS sequence. The tests were conducted to provide EPA with information regarding:

- Variability in short test emission results
- Impact of off-idle no-load preconditioning cycles on short test emissions, and
- Emission differences between a fully-warmed vehicle and a "soaked" vehicle having undergone minimum operation.

Hydrocarbon and carbon monoxide emissions are reported for each vehicle in tabular and graphical form. Hydrocarbons are reported in ppm and carbon monoxide in percent.

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SUMMARY

Twice-weekly I/M emission short tests were conducted on twenty-five late model (1981 model year or later) gasoline-fueled vehicles over a 15-week time period. Each vehicle was tested once in the morning upon arrival at the test site from home and again later that same day following a soak period of three or more hours. The vehicles tested in the program were owned by Southwest Research Institute employees and represented a variety of vehicle types and emission control systems. Emission tests were conducted using Bear Automotive Type 42-925 4-Gas Infrared Analyzers with generic software. Each emission test included a "TAS" sequence (2500 rpm and idle tests with emissions measured in both modes), a three-minute 2500 rpm conditioning step, and a second TAS sequence. The tests were conducted to provide EPA with information on the variability in short test emission results, the impact of off-idle no-load preconditioning cycles on short test emissions, and emission differences between a fully-warmed vehicle and a "soaked" vehicle having undergone minimum operation. Hydrocarbon, carbon monoxide, oxygen, and carbon dioxide emissions were measured for each test mode. Only the hydrocarbon emissions (in ppm) and carbon monoxide emissions (in percent) were reported and evaluated in this program. The most significant observations made from the data generated (not necessarily in order of importance) are as follows:

- In general, the average hydrocarbon and carbon monoxide emissions were lower (or unchanged) after the 2500 rpm conditioning step for both the 2500 rpm and idle tests, both during the morning and afternoon test sequences.

- Vehicle 09, a 1985 Volkswagen Golf, gave atypical results with average carbon monoxide emission increases on the 2500 rpm mode of approximately two volume percent after the 2500 rpm conditioning with the morning 2500 rpm test (average increased from 1.11 to 3.20 percent) and the afternoon idle test (average increased from 0.07 to 2.03 percent).

- Emissions were typically higher (or unchanged) for the tests after the three-hour soak period than for the morning test.

- Some of the vehicles had average hydrocarbon increases of greater than 100 ppm for the 2500 rpm test (Vehicle 05, a 1981 Honda Civic; Vehicle 06, a 1985 Honda Accord; Vehicle 10, a 1985 BMW 318i; Vehicle 13, a Ford Ranger; and Vehicle 19, a 1985 Chevrolet Cavalier) and the idle test (Vehicle 05; Vehicle 10; Vehicle 13; Vehicle 17, a 1986 Ford E-150 Van; Vehicle 19; Vehicle 22, a 1987 Chevrolet Astro Van; and Vehicle 23, a 1987 Nissan Pulsar), and carbon monoxide emission increases of greater than one volume percent for the 2500 rpm test (Vehicle 05; Vehicle 06; and Vehicle 16, a 1986 Ford Thunderbird) and idle test (Vehicle 17) for the tests after the soak period as compared to the morning tests.

- Many of the vehicles had highly variable hydrocarbon and carbon monoxide emission rates over the 15-week test period, with standard deviations greater than the averaged results. A number of the high standard deviation values could be significantly reduced by excluding one

or two unexplained outliers from the data set. Other high standard deviations (in relation to the average value) were associated with average values of less than 10 ppm hydrocarbons and 0.1 percent carbon monoxide.

The idle and 2500 rpm test results have been summarized in the following tables. The test results are compared to the 1.2 percent carbon monoxide and the 220 ppm hydrocarbon cut points.

SUMMARY OF IDLE TEST RESULTS

	Morning Tests		Afternoon Tests	
	Before 2500 rpm Conditioning	After 2500 rpm Conditioning	Before 2500 rpm Conditioning	After 2500 rpm Conditioning
Percent of tests exceeding 1.2/220[a]	3.2	1.3	20	3.5
Percent of all vehicles exceeding 1.2/220 at least once	20	8.0	48	16
Percent of all vehicles exceeding 1.2/220 at least twice	16	4.0	44	8.0
Percent of all vehicles exceeding 1.2/220 at least 50 percent of the tests	0	0	20	0
Percent of all vehicles exceeding 1.2/220 for at least one pair of adjacent weeks	4.0	4.0	28	8.0
Percent of tests exceeding 1.2/220 that are isolated and unexplained[b]	83	40	19	38

---

[a] 1.2/220, 1.2 percent carbon monxide and/or 220 ppm hydrocarbons.

[b] Both the previous and subsequent week's results did not exceed 1.2/220, and not clearly related to vehicle maintenance or need of maintenance.

SUMMARY OF 2500 RPM TEST RESULTS

	Morning Tests		Afternoon Tests	
	Before 2500 rpm Conditioning	After 2500 rpm Conditioning	Before 2500 rpm Conditioning	After 2500 rpm Conditioning
Percent of tests exceeding 1.2/220[a]	5.6	8.9	16	6.5
Percent of all vehicles exceeding 1.2/220 at least once	20	20	40	20
Percent of all vehicles exceeding 1.2/220 at least twice	12	12	28	20
Percent of all vehicles exceeding 1.2/220 at least 50 percent of the tests	4.0	12	12	4.0
Percent of all vehicles exceeding 1.2/220 for at least one pair of adjacent weeks	12	12	24	12
Percent of tests exceeding 1.2/220 that are isolated and unexplained[b]	14	9.1	19	21

---

[a] 1.2/220, 1.2 percent carbon monxide and/or 220 ppm hydrocarbons.

[b] Both the previous and subsequent week's results did not exceed 1.2/220, and not clearly related to vehicle maintenance or need of maintenance.

I. INTRODUCTION

The objectives of this program were to determine the variability in short test emission results, the impact of off-idle no-load preconditioning cycles on short-term emissions, and the emission differences between a fully-warmed vehicle and a "soaked" vehicle with minimum operation after starting. Twice-weekly I/M (Inspection and Maintenance) emission short tests were conducted on twenty-five late model (1981 model year and later) gasoline-fueled vehicles over a 15-week time period. Each vehicle was tested once in the morning and again later the same day after a soak period of at least three hours. Each emission test sequence included a "TAS" sequence (i.e., 2500 rpm and idle test with hydrocarbon and carbon monoxide emissions measured on both modes) and a vehicle conditioning step utilizing three minutes of engine operation at 2500 rpm, followed by a second TAS sequence. This report describes the vehicles, the analyzers, and the test procedures; and reports the results of the testing in tabular and graphical form. Hydrocarbon emissions are reported in parts per million and carbon monoxide emissions in percent.

The twenty-five vehicles tested in this program were owned by Southwest Research Institute employees and were selected to represent a variety of vehicle types and emission control systems. A complete list and descriptions of the vehicles can be found in Section II of this report. Before accepting the vehicles into the program, each vehicle was subjected to an initial vehicle inspection including checks for emission tampering, for lead in the fuel, and for lead in tailpipe deposits (Plumbtesmo paper test). An increasing scale of cash incentives was used to keep the vehicle owners interested in the program and from dropping out late in the program.

Two Bear Automotive Type 42-925 4-Gas Infrared Analyzers with generic software were used to conduct the "TAS" sequences on the vehicles. TAS refers to the May 1983 revision to the Test Analyzer Specifications published by the California Bureau of Automotive repair. Gas calibrations on the analyzers were performed at least daily with a low range calibration gas (1.6 percent carbon monoxide, 600 ppm propane, and 11 percent carbon dioxide) in accordance with the manufacturer's specifications.

The vehicles were tested twice on one day of the week (once in the morning and again later the same day following a three-hour minimum soak period) over the 15-week test period. Vehicles were typically tested Monday through Thursday with an attempt to vary the day of the week a given vehicle was tested. Tests were conducted on Friday if scheduling difficulties were encountered or retesting was required. Vehicle tests were scheduled at 15-minute intervals (both in the morning and after the soak period) to minimize waiting time. Ambient temperatures were recorded at the midpoint of each test period. Vehicle owners completed checklists during each test sequence to provide information on fuel gauge readings, fuel purchased, odometer mileage, vehicle operation while waiting for testing, and any vehicle maintenance since the previous test.

Each test sequence performed on the 25 test vehicles consisted of the following steps: (1) connect tachometer pickup to vehicle without turning off engine, (2) perform TAS sequence - 2500 rpm and idle tests with emissions measured in both modes, (3) run three minutes of 2500 rpm engine conditioning, (4) idle for 15 seconds, and (5) perform a second TAS sequence. For each of the four Ford/Mercury vehicles, the engine was shut off for 15 seconds prior to both TAS sequences. Hydrocarbon, carbon monoxide, oxygen, and carbon dioxide emissions were measured and recorded for each test mode. Only the carbon monoxide and hydrocarbon emissions are discussed in this report.

II. VEHICLES, EQUIPMENT, VEHICLE TESTING, AND TEST SEQUENCE

This section describes the test vehicles, the TAS-type analyzers, and the test procedures utilized in this project. The vehicle procurement process is also described in detail.

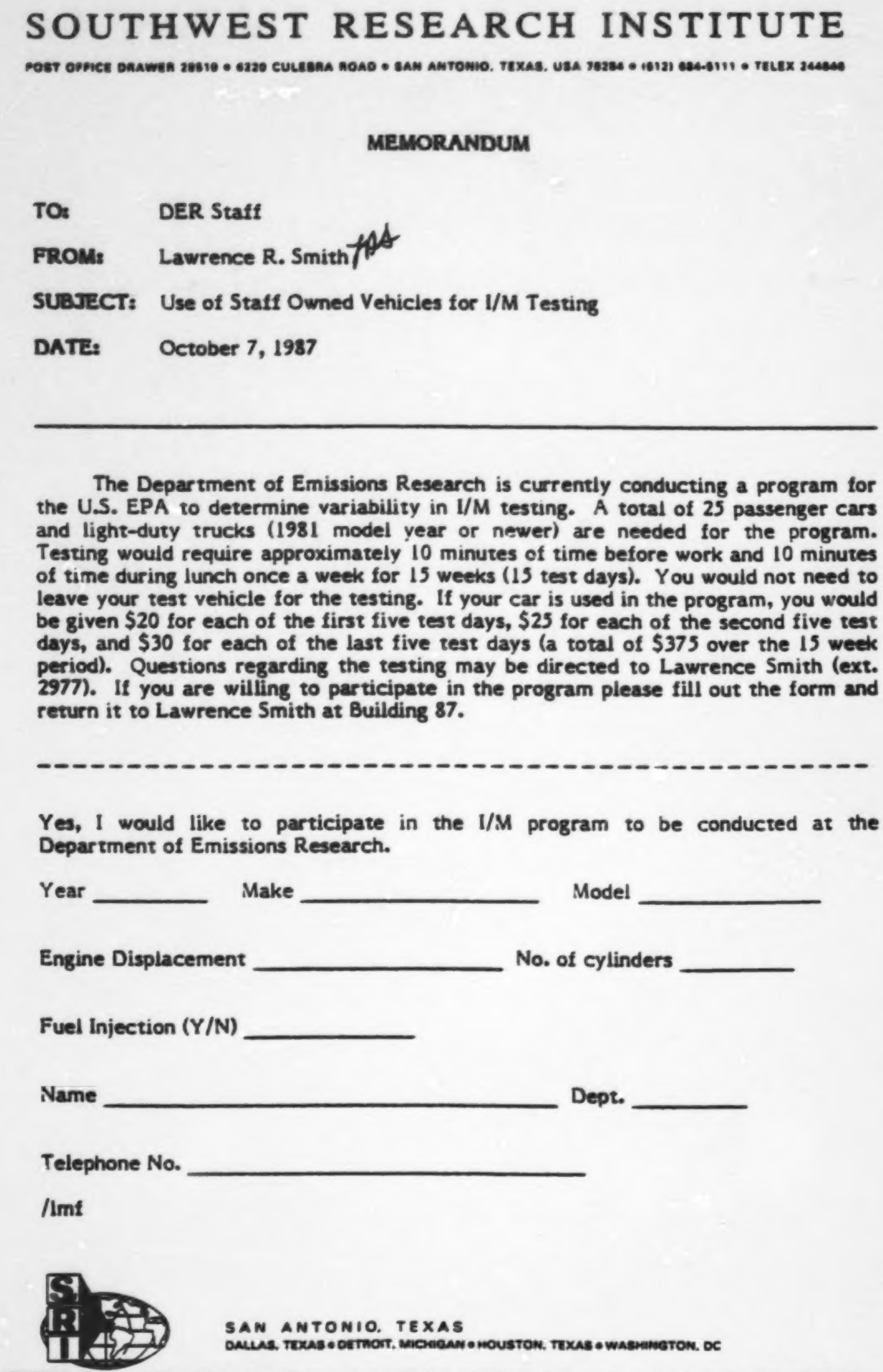
A. Test Vehicles

Twenty-five gasoline-powered light-duty vehicles were evaluated in this project. The vehicles are listed in Table 1 along with their engine sizes and fuel delivery systems. All but one of the vehicles were procured from the SwRI Department of Emissions Research (DER) staff. These DER employees all worked at the test site location. The remaining vehicle (Vehicle Number 23) was procured from an SwRI employee in a building located across the street from the test site (approximately an additional 100 yards from the test site). The vehicle procurement process consisted of sending a memorandum (Figure 1) to the DER Staff requesting vehicles for the program. A total of thirty-three responses to the memorandum were received, and the twenty-five vehicles were selected from these responses. The set of vehicles listed in Table 1 was selected to meet the requirements set forth in the project Work Plan for fleet breakdown by fuel injection/carburetion, passenger car/light-duty truck, imported/domestic, GM/non-GM, and open-loop/closed-loop. The required and selected mixes of vehicles are listed below:

Criterion	Required Number of Vehicles	Number of Vehicles Selected
Fuel Injected	13	13
Carbureted	12	12
Passenger Car	18	18
Light-Duty Truck	7	7
Domestic	15-20	15
Imported	5-10	10
GM	12	9
Open-Loop	5-12	5
Closed-Loop	13-20	20

The eight vehicles volunteered but not selected for the program were all light-duty trucks. Due to the limitation of seven light-duty trucks for the program, these vehicles were not used.

Before accepting the vehicles into the program, each vehicle was subjected to an initial vehicle inspection. A sample inspection sheet is shown in Figure 2. None of the vehicles showed signs of emission tampering and all were in acceptable operating condition. All vehicles exhibited negative results for the Plumbtesmo paper tailpipe lead test. Fuel samples were taken from each vehicle during the initial inspection and analyzed for lead using a Scientific Glass & Instruments, Inc.



SOUTHWEST RESEARCH INSTITUTE

POST OFFICE DRAWER 28510 • 6220 CULEBRA ROAD • SAN ANTONIO, TEXAS, USA 78284 • (512) 684-5111 • TELEX 244846

MEMORANDUM

TO: DER Staff

FROM: Lawrence R. Smith

SUBJECT: Use of Staff Owned Vehicles for I/M Testing

DATE: October 7, 1987

The Department of Emissions Research is currently conducting a program for the U.S. EPA to determine variability in I/M testing. A total of 25 passenger cars and light-duty trucks (1981 model year or newer) are needed for the program. Testing would require approximately 10 minutes of time before work and 10 minutes of time during lunch once a week for 15 weeks (15 test days). You would not need to leave your test vehicle for the testing. If your car is used in the program, you would be given $20 for each of the first five test days, $25 for each of the second five test days, and $30 for each of the last five test days (a total of $375 over the 15 week period). Questions regarding the testing may be directed to Lawrence Smith (ext. 2977). If you are willing to participate in the program please fill out the form and return it to Lawrence Smith at Building 87.

- -

Yes, I would like to participate in the I/M program to be conducted at the Department of Emissions Research.

Year __________ Make ____________________ Model ________________

Engine Displacement ______________________ No. of cylinders __________

Fuel Injection (Y/N) ______________

Name ______________________________________ Dept. __________

Telephone No. ______________________________

/lmf

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FIGURE 1. MEMORANDUM SOLICITING VEHICLES FOR THE TEST PROGRAM

INITIAL VEHICLE INSPECTION

Date: _____/_____/_____

Make ________________ Model ________________________ Model Year _______

Transmission _________ Engine Displacement __________ Engine Family __________

VIN _________________________________ Project Vehicle No. ________________

1. Can the vehicle be operated in netural at 2500 rpm for three (3) minutes without damage? (Y/N) __________
   *If No, stop inspection and reject vehicle.
2. Are the oxygen sensor and ECM pigtails connected? (Y/N) __________
3. What is the status of the idle mixture seals? (intact, tampered, not verified)
   ____
4. Are any electrical lines or vacuum hoses misrouted or disconnected? (Y/N)
   ______ Explain ____
5. What is the status of the air pump and secondary air routing valves?
   ____
6. Is the catalyst in place? (Y/N) __________
7. Is the fuel filler inlet restrictor enlarged or missing? (Y/N) __________
8. What is the result of the tailpipe lead test using Plumbtesmo paper? (positive/negative) __________________________
9. What is the lead content of the fuel? __________________________________
10. Which, if any, computer trouble codes are present? ________________________

FIGURE 2. INITIAL VEHICLE INSPECTION SHEET

TABLE 1. TEST VEHICLES SELECTED FOR I/M TESTING

Vehicle Number	Year	Make	Model	Engine Displacement, ℓ	Fuel Injection Yes/No	Closed-Loop Control (Yes/No)
01	1982	Mercury	Zephyr	3.3	No	No
02	1984	Dodge	Ramcharger	5.9	No	No
03	1984	Oldsmobile	Delta 88	5.0	No	Yes
04	1985	Chevrolet	Silverado	5.0	No	No
05	1981	Honda	Civic	1.3	No	No
06	1985	Honda	Accord	1.8	No	Yes
07	1987	Jeep	Cherokee	4.0	Yes	Yes
08	1982	Peugeot	505	2.0	Yes	Yes
09	1985	Volkswagen	Golf	1.8	Yes	Yes
10	1985	BMW	318i	1.8	Yes	Yes
11	1986	Nissan	Pulsar	1.6	No	Yes
12	1984	Chevrolet	Suburban	5.7	No	No
13	1985	Ford	Ranger	2.3	Yes	Yes
14	1986	Oldsmobile	Cutlass Supreme	3.8	No	Yes
15	1987	Hyundai	Excel GLS	1.5	No	Yes
16	1986	Ford	Thunderbird	2.3	Yes	Yes
17	1986	Ford	E-150 Van	5.0	Yes	Yes
18	1984	Chevrolet	Caprice Classic	5.0	No	Yes
19	1985	Chevrolet	Cavalier	2.0	Yes	Yes
20	1987	Buick	LeSabre	3.8	Yes	Yes
21	1982	Volkswagen	Scirocco	1.7	Yes	Yes
22	1987	Chevrolet	Astro Van	4.3	Yes	Yes
23	1987	Nissan	Pulsar	1.6	Yes	Yes
24	1986	Buick	Century	2.8	No	Yes
25	1982	Volvo	240DL	2.1	Yes	Yes

Model 33060 Ledometer Kit. The results of these analyses are presented in Table 2. All twenty-five vehicles had a lead content in the fuel of less than 0.05 g/gal.

In an attempt to keep vehicle owners interested in the program and to prevent them from dropping out late in the program, an increasing scale of each incentives was used (Figure 1). This increasing scale consisted of $20 for each of the first five test days, $25 for each of the second five test days, and $30 for each of the last five test days. Only one owner dropped out of the program (after 12 test days) because of retirement and a move out of state. Due to the late date of this withdrawal from the program, the vehicle was not replaced in the program.

B. Emission Testing Equipment

Two Bear Automotive Type 42-925 4-Gas Infrared Analyzers with generic software were leased for use in the program. The analyzer software used in the program allowed a "TAS" sequence to be performed on each vehicle. "TAS" refers to the May 1983 revision of the "Test Analyzer Specifications" published by the California Bureau of Automotive Repair. One of the analyzers was used with a

TABLE 2. RESULTS OF FUEL LEAD ANALYSES USING SGI MODEL 33060 LEDOMETER KIT

Vehicle Number	Vehicle Make and Model	Lead Content, g/gal
01	Mercury Zephyr	0.036
02	Dodge Ramcharger	0.045
03	Oldsmobile Delta 88	0.021
04	Chevrolet Silverado	0.022
05	Honda Civic	0.023
06	Honda Accord	0.001
07	Jeep Cherokee	0.035
08	Peugeot 505	0.006
09	Volkswagen Golf	0.014
10	BMW 318i	0.023
11	Nissan Pulsar	0.023
12	Chevrolet Suburban	0.024
13	Ford Ranger	0.017
14	Oldsmobile Cutlass Supreme	0.023
15	Hyundai Excel GLS	0.046
16	Ford Thunderbird	0.011
17	Ford E-150 Van	0.025
18	Chevrolet Caprice Classic	0.006
19	Chevrolet Cavalier	0.010
20	Buick LeSabre	0.005
21	Volkswagen Scirocco	0.021
22	Chevrolet Astro Van	0.014
23	Nissan Pulsar	0.007
24	Buick Century	0.027
25	Volvo 240 DL	0.023

Snap-on MT255 Distributorless Adaptor to allow rpm measurements on Vehicle 20, which had a GM distributorless ignition system. A Scott Certified Blend of 1.6 percent carbon monoxide, 600 ppm propane (300 ppm hexane), and 11 percent carbon dioxide was used as the calibration gas for the analyzers. Gas calibrations were performed with the low range calibration gas in accordance with Bear's specifications and were conducted at least daily. All calibrations and leak checks were documented in a log book maintained with each analyzer. Documentation entries included the date, initials of person performing the calibration, and the results of the calibration. All maintenance performed on the analyzers, including changing of the calibration gas cylinders, was included in the log book. One unit (designated as SwRI Unit No. 1) had intermittent problems with a loose cable connection which was repaired in-house. This same unit went out of calibration during the thirteenth week of testing and had to be repaired by Bear. This unit was not used again until the final week of testing.

C. Vehicle Testing

Each of the 25 vehicles was tested twice on one day of the week (once in the morning and again later that same day following a soak period of three to four hours) over a period of 15 weeks. One of the vehicles (Vehicle 13) completed only twelve sequences in the program because of the retirement and subsequent move to Arizona of the owner. Prior to the move, two test sequences (two test days) were conducted on the vehicle during the week of January 25 for the eleventh and twelfth test sequences. Vehicle 21 was also tested two days a week during the weeks of February 8, 15, and 22. The owner of Vehicle 21 was out of town during a large part of the program, and this procedure change was necessary to complete the testing of Vehicle 21 during the same time period as the other test vehicles. Before being implemented, this procedure change was approved by the EPA Project Technical Monitor.

Vehicles were typically tested Monday through Thursday with an attempt to vary the day of the week a given vehicle was tested. Tests were also conducted on Friday if required due to scheduling difficulties. No vehicle was tested more than five times, and only two were tested more than four times, on any one day of the week. Five to seven vehicles were tested during a typical test day. Vehicles were scheduled for testing between 7:30 and 8:30 in the morning, at 15-minute intervals, to minimize waiting time and lost work time, and to eliminate as much of the inconvenience to the drivers as possible. Each vehicle was rescheduled for a second test between 10:45 AM and 12:15 PM on the same day. These tests were scheduled to allow the vehicle to soak for a minimum of three hours. As was the case for the morning tests, the vehicles were scheduled at 15-minute intervals to minimize waiting time. The Technical Project Monitor, Mr. Larry Landman, visited SwRI on November 17 and 18. Mr. Landman was present to view morning and noon I/M testing on November 18.

The outside air temperature was recorded at approximately the midpoint of each testing period (both morning and at noon) each day. These temperature data have been included in Appendix A. For each morning and noon test, vehicle owners were asked to complete the checklists shown in Figures 3 and 4, respectively. The information obtained from these checklists is summarized in the following paragraph.

None of the vehicle owners reported purchasing fuel with alcohol. The owners of Vehicles 03, 12, 14, and 22 reported that they were not sure if their last fuel purchase contained any alcohol. Fuel gauge readings, waiting periods for morning and noon tests, analyzers used for morning and noon tests (No. 01 or 02), test date, and soak periods between morning and noon tests are included in Appendix Tables B-1 through B-25. Any deviations from normal scheduled test periods and the operating conditions of the test vehicles during waiting periods are also noted in the tables. Appendix C contains a summary of the engine and exhaust maintenance and analyzer operator comments that were recorded on the checklists.

D. Test Sequence

The TAS analyzers were each located at a separate garage door entrance to the Department of Emissions Research high bay area. The test vehicles were driven by their owners (or designated drivers) partially into the high bay area with their exhaust pipes at or near the open bay door. Each of the test sequences (both morning and noon) performed on each of the 25 test vehicles consisted of the following steps. The analyzer's tachometer pickup was attached to the vehicle without turning off the engine. For the Ford models (Vehicles 01, 13, 16, and 17),

Pre-Test Checklist

Morning Test **MILEAGE:** ____________

Vehicle Number: ________________________________

Date: ___/___/___ **Time:** __:___ A.M.

1. Was the vehicle brought directly to the test site from on-the-road operation? (Y/N) ____

**** If NO, STOP the test and reschedule the vehicle for a test sequence later in the week. *****

2.A. Did the vehicle wait in line before the test? (Y/N) ____

B. If yes, approximately how many minutes elapsed between the time the vehicle arrived in line and the test operator gave the first instruction to the driver? ____

**** If the vehicle waited in line more than 15 minutes, STOP the test and reschedule the vehicle for a test sequence later in the week if possible. *****

C. If the vehicle waited in line less than 15 minutes, were any major accessories (e.g., heater/defroster, A/C, rear window defogger) operating? ____

D. If the vehicle waited in line less than 15 minutes, select the best description of the vehicle's operation during the wait (check only one of the following):

- Primarily idle-in-neutral except when moving forward in line. ____
- Primarily idle-in-drive except when moving forward in line. ____
- Primarily engine off. Restarted and advanced in line as necessary. ____
- Primarily with accelerator part way to the floor, in neutral, to maintain high rpm. ____

3. What was the last fuel purchase (check only one of the following):

- Gasoline with no alcohol ____
- Gasoline with some alcohol ____
- Not sure ____

4. What does the vehicle's fuel guage currently read? ____

5. What engine or exhaust maintenance (if any) was performed since the last test? (This should include everything engine related except refueling the vehicle and checking the fluid levels. Adding oil must be reported.)

____

____

____

FIGURE 3. PRE-TEST CHECKLIST (MORNING TEST)

Pre-Test Checklist

Afternoon Test

Vehicle Number: ______________________________

Date: ___/___/___ **Time:** __:___ **P.M.**

1. **Was the vehicle operated off-site at any time during the past 3 hours? (Y/N)** ____

****** If YES, STOP the test and reschedule the vehicle for a *******

test sequence later in the week if possible.

2.A. Did the vehicle wait in-line before the test? (Y/N) ____

B. If yes, approximately how many minutes elapsed between the time the vehicle arrived in line and the test operator gave the first instruction to the driver? ____

****** If the vehicle waited in line more than 15 minutes, STOP the test and reschedule the vehicle for a test sequence later in the week if possible. *******

C. If the vehicle waited in line less than 15 minutes, were any major accessories (e.g., heater/defroster, A/C, rear window defogger) operating? ____

D. If the vehicle waited in line less than 15 minutes, select the best description of the vehicle's operation during the wait (check only one of the following):

- **Primarily idle-in-neutral except when moving forward in line.** ____
- **Primarily idle-in-drive except when moving forward in line.** ____
- **Primarily engine off. Restarted and advanced in line as necessary.** ____
- **Primarily with accelerator part way to the floor, in neutral, to maintain high rpm.** ____

FIGURE 4. PRE-TEST CHECKLIST (AFTERNOON TEST)

the engine was switched off; after 15 seconds, the engine was restarted, and the probe was reinserted into the tailpipe. A TAS sequence (i.e., 2500 rpm/idle test with emissions measured on both modes) was then performed. The "TAS Sequence" used the Bear Automotive analyzers' software to determine when to measure the emissions. The nomenclature used for the Bear analyzer test modes was the reverse of what was described in EPA's request for a work plan (i.e., the Bear analyzers' "diagnostic mode" uses its software to determine when to measure the emissions, and the emissions mode is a continuous measurement mode).

After the TAS sequence, the engine speed was increased to 2500 ± 300 rpm and maintained for three minutes with the vehicle transmission remaining in neutral. Because of the analzyers' software, it was necessary to use a second tachometer for the three minutes of 2500 rpm operation. After the 2500 rpm operation, the vehicle was returned to idle for 15 seconds. For the Ford models, the engine was switched off, and the probe removed from the tailpipe. After 15 seconds, the engine was restarted, and the probe reinserted into the tailpipe. Finally, a second TAS sequence was performed. Hydrocarbon, carbon monoxide, oxygen, and carbon dioxide emissions were measured and recorded for each test mode.

III. TEST RESULTS

This section presents the hydrocarbon and carbon monoxide emission results for the TAS sequences conducted on each of the 25 test vehicles. The test data have been tabulated, graphed, and averaged for each vehicle. A tabular summary of the hydrocarbon and carbon monoxide emission test scores for each of the 25 test vehicles is presented in Appendix D. Each appendix table identifies the vehicle by:

- Vehicle Identification Number
- Project Vehicle Number
- Engine family
- Engine displacement
- Make, model, and model year, and
- Transmission type.

Each table also presents the data in chronological order with the appropriate morning odometer reading (miles). The emission results are presented in sixteen columns including hydrocarbon and carbon monoxide results for the morning and noon tests, both before and after three minutes of 2500 rpm conditioning and for both the idle and 2500 rpm tests. Tables 3, 4, 5, and 6 present averages and standard deviations of the hydrocarbon and carbon monoxide results for each vehicle at each test condition over the 15-week test period. Appendices E, G, I, and K present plots for each vehicle of the HC-2500 rpm, HC-Idle, CO-2500 rpm, and CO-Idle emission results versus time, respectively. Each individual plot contains separate plots for each of the four different values obtained each week (i.e., morning before and after 2500 rpm conditioning, and noon before and after 2500 rpm conditioning).

On March 4, 1988, Dr. Lawrence Smith and Mr. Charles Hare of SwRI met with Mr. Craig Harvey, Project Officer; Mr. Larry Landman, Project Technical Monitor; and Mr. James A. McCargar, all of EPA-Ann Arbor to review the project status. At this meeting, Mr. Landman and Mr. McCargar indicated that a common scale for the hydrocarbon and carbon monoxide emissions was necessary for vehicle-to-vehicle comparisons. A review of the data indicated that most of the 2500 rpm and idle hydrocarbon data (Appendices E and G) could be presented on a 0-200 ppmC scale and that most of the 2500 rpm and idle (Appendices I and K) carbon monoxide data could be presented on a 0-2 percent scale. Vehicles with several (four or more) values exceeding the range for the scales were replotted with larger scales (Appendices F, H, J, and L). The following sections discuss the hydrocarbon and carbon monoxide emission results for the 2500 rpm and idle tests.

A. HC Emissions - 2500 RPM

The hydrocarbon emission test results at 2500 rpm were averaged for each vehicle at each test point, with the averages and standard deviations presented in Table 3. Plots of the data are included in Appendix E (hydrocarbons on 0-200 ppm scale) for all vehicles and in Appendix F (hydrocarbons on larger scale) for Vehicles 02, 05, and 16. In general, the 2500 rpm hydrocarbon emissions were lower after the 2500 rpm conditioning step both during the morning and afternoon tests. Vehicles 09 (Volkswagen Golf) and 10 (BMW), however, did show an overall increase in hydrocarbon emissions after the morning conditioning step. Pre-conditioned

TABLE 3. AVERAGE HC 2500 RPM EMISSIONS, PPM

	Morning Tests				Afternoon Tests			
	Before 2500 rpm Conditioning		After 2500 rpm Conditioning		Before 2500 rpm Conditioning		After 2500 rpm Conditioning	
Project Vehicle Number	Avg.	Std.Dev.	Avg.	Std.Dev.	Avg.	Std.Dev.	Avg.	Std.Dev.
01	25	± 21	7	± 4	33	± 17	10	± 3
02	85	± 180	43	± 65	107	± 144	82	± 165
	(17)[a]	± (13)[a]	(19)[a]	± (15)[a]	(53)[a]	± (13)[a]	(19)[a]	± (11)[a]
03	34	± 14	17	± 13	82	± 65	47	± 79
							(14)[b]	± (6)[b]
04	5	± 3	3	± 2	38	± 9	3	± 2
05	10	± 4	4	± 2	210	± 220	8	± 3
06	1	± 1	<1	± <1	109	± 28	2	± 1
07	<1	± 1	0	± 0	5	± 4	0	± 0
08	<1	± 1	0	± 0	32	± 6	1	± 1
09	18	± 20	54	± 20	22	± 14	4	± 7
10	60	± 31	74	± 25	183	± 34	85	± 24
11	3	± 3	1	± 1	27	± 59	2	± 2
					(12)[c]	± (10)[c]		
12	25	± 11	10	± 4	84	± 63	12	± 7
13	49	± 42	43	± 36	162	± 18	77	± 39
14	10	± 3	6	± 3	11	± 11	7	± 4
15	8	± 7	4	± 2	16	± 9	6	± 3
16	149	± 239	118	± 157	207	± 336	211	± 335
	(73)[d]	± (35)[d]	(66)[d]	± (45)[d]	(90)[d]	± (43)[d]	(86)[d]	± (40)[d]
17	9	± 13	1	± 1	71	± 34	6	± 10
18	1	± 2	<1	± 1	8	± 6	<1	± <1
19	9	± 12	5	± 2	151	± 13	17	± 8
20	<1	± 1	0	± 0	4	± 4	0	± 0
21	2	± 3	<1	± 1	33	± 10	3	± 10
22	1	± 1	2	± 2	83	± 15	3	± 6
23	<1	± 1	<1	± 1	83	± 10	2	± 3
24	5	± 9	0	± 0	13	± 13	<1	± <1
25	22	± 15	9	± 9	69	± 12	18	± 5

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[a] Values in parentheses exclude data from the 2/26/88 and 2/29/88 tests.
[b] Values in parentheses exclude data from the 12/3/87 and 1/26/88 tests.
[c] Values in parentheses exclude data from the 1/5/88 test.
[d] Values in parentheses exclude data from the 2/2/88 and 2/10/88 tests.

TABLE 4. AVERAGE HC IDLE EMISSIONS, PPM

	Morning Tests				Afternoon Tests			
Project Vehicle Number	Before 2500 rpm Conditioning		After 2500 rpm Conditioning		Before 2500 rpm Conditioning		After 2500 rpm Conditioning	
	Avg.	Std.Dev.	Avg.	Std.Dev.	Avg.	Std.Dev.	Avg.	Std.Dev.
01	120	± 73	83	± 19	94	± 37	79	± 15
02	27	± 12	20	± 11	43	± 8	22	± 9
03	32	± 13	26	± 21	90	± 75	47	± 79
							(29)[a]	± (31)[a]
04	4	± 3	2	± 2	53	± 22	3	± 3
05	4	± 2	2	± 1	175	± 70	3	± 2
06	7	± 1	3	± 1	102	± 91	8	± 2
07	<1	± 1	0	± 0	4	± 6	0	± 0
08	1	± 1	<1	± 1	83	± 30	2	± 2
09	14	± 19	10	± 10	22	± 6	49	± 50
10	13	± 30	11	± 28	228	± 43	18	± 39
	(6)[b]	± (16)[b]	(4)[b]	± (5)[b]			(8)[b]	± (3)[b]
11	2	± 2	1	± 1	21	± 51	2	± 2
					(8)[c]	± (6)[c]		
12	16	± 14	4	± 3	76	± 42	12	± 7
13	166	± 153	144	± 119	328	± 144	163	± 61
14	2	± 2	1	± 2	7	± 19	1	± 1
					(3)[d]	± (2)[d]		
15	2	± 2	0	± 0	17	± 13	3	± 2
16	29	± 29	14	± 21	110	± 85	23	± 29
17	21	± 13	12	± 11	225	± 118	34	± 28
18	5	± 3	4	± 3	31	± 31	4	± 3
19	162	± 44	110	± 29	253	± 21	149	± 30
20	<1	± 1	0	± 0	4	± 2	0	± 0
21	3	± 3	13	± 19	25	± 6	10	± 9
22	53	± 36	62	± 28	223	± 32	55	± 33
23	22	± 52	2	± 3	217	± 73	9	± 4
24	1	± 2	<1	± 1	3	± 3	<1	± 1
25	44	± 39	23	± 29	82	± 42	28	± 22

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[a] Values in parentheses exclude data from the 1/26/88 test.
[b] Values in parentheses exclude data from 1/7/88 test.
[c] Values in parentheses exclude data from the 1/5/88 test.
[d] Values in parentheses exclude data from the 12/8/87 test.

TABLE 5. AVERAGE CO 2500 RPM EMISSIONS, PERCENT

Project Vehicle Number	Morning Tests				Afternoon Tests			
	Before 2500 rpm Conditioning		After 2500 rpm Conditioning		Before 2500 rpm Conditioning		After 2500 rpm Conditioning	
	Avg.	Std.Dev.	Avg.	Std.Dev.	Avg.	Std.Dev.	Avg.	Std.Dev.
01	0.02	±0.05	0.00	±0.00	0.01	±0.03	0.00	±0.00
02	0.02	±0.02	0.01	±0.02	0.75	±0.45	0.01	±0.01
03	0.02	±0.06	0.20	±0.34	0.81	±1.12	0.62 (0.15)[a]	±1.24 ±(0.15)[a]
04	<0.01	±<0.01	0.00	±0.00	0.21	±0.10	0.00	±0.00
05	0.00	±0.00	0.00	±0.00	1.27	±1.48	0.00	±0.00
06	0.00	±0.00	0.00	±0.00	2.47	±0.86	0.00	±0.00
07	0.00	±0.00	0.00	±0.00	0.04	±0.03	0.00	±0.00
08	0.00	±0.00	<0.01	±0.01	0.40	±0.22	0.01	±0.01
09	1.11	±1.15	3.20	±1.60	0.13	±0.05	0.19	±0.40
10	0.94	±0.36	1.25	±0.34	1.49	±0.29	0.90	±0.35
11	0.01	±0.02	<0.01	±<0.01	0.58 (0.13)[b]	±1.74 ±(0.28)[b]	0.01	±0.02
12	0.01	±0.03	0.00	±0.00	0.13	±0.09	0.00	±0.00
13	0.32	±0.37	0.36	±0.39	0.68	±0.27	0.80	±0.73
14	0.00	±0.00	0.00	±0.00	0.02	±0.04	0.00	±0.00
15	<0.01	±<0.01	0.00	±0.00	0.04	±0.13	0.00	±0.00
16	1.47	±0.59	1.11	±0.39	3.04	±1.62	1.63	±0.45
17	0.05	±0.15	<0.01	±0.01	0.67	±0.67	0.12	±0.31
18	0.01	±0.02	0.03	±0.03	<0.01	±0.01	0.03	±0.04
19	0.06	±0.07	0.05	±0.06	0.40	±0.05	0.06	±0.03
20	<0.01	±<0.01	0.00	±0.00	0.01	±0.01	0.00	±0.00
21	0.02	±0.05	<0.01	±0.01	0.22	±0.18	0.02	±0.08
22	<0.01	±0.01	0.00	±0.00	0.43	±0.23	0.01	±0.01
23	<0.01	±0.01	0.00	±0.00	0.55	±0.03	0.00	±0.00
24	0.12	±0.16	0.06	±0.04	0.08	±0.12	0.06	±0.04
25	0.39	±0.21	0.30	±0.30	0.63	±0.11	0.37	±0.07

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[a] Values in parentheses exclude data from the 12/3/87 and 1/26/88 tests.
[b] Values in parentheses exclude data from the 1/5/88 test.

TABLE 6. AVERAGE CO IDLE EMISSIONS, PERCENT

	Morning Tests				Afternoon Tests			
	Before 2500 rpm Conditioning		After 2500 rpm Conditioning		Before 2500 rpm Conditioning		After 2500 rpm Conditioning	
Project Vehicle Number	Avg.	Std.Dev.	Avg.	Std.Dev.	Avg.	Std.Dev.	Avg.	Std.Dev.
01	0.38	± 0.81	0.00	± 0.00	<0.01	± 0.01	0.00	± 0.00
	(0.01)[a]	±(0.02)[a]						
02	<0.01	±<0.01	0.00	± 0.00	0.38	± 0.43	0.00	± 0.00
03	0.00	± 0.00	0.04	± 0.09	0.01	± 0.01	0.14	± 0.34
							(0.06)[b]	± (0.09)[b]
04	0.00	± 0.00	0.00	± 0.00	0.02	± 0.01	0.00	± 0.00
05	0.00	± 0.00	0.00	± 0.00	0.45	± 1.45	0.00	± 0.00
					(0.09)[c]	±(0.04)[c]		
06	0.00	± 0.00	0.00	± 0.00	0.05	± 0.08	0.00	± 0.00
07	0.00	± 0.00	0.00	± 0.00	<0.01	± 0.01	0.00	± 0.00
08	0.00	± 0.00	0.01	± 0.02	0.04	± 0.03	<0.01	±<0.01
09	0.30	± 0.59	0.13	± 0.48	0.07	± 0.03	2.03	± 2.39
10	0.08	± 0.18	0.08	± 0.19	0.45	± 0.17	0.04	± 0.13
11	0.00	± 0.00	0.00	± 0.00	0.15	± 0.54	0.00	± 0.00
					(0.01)[d]	± (0.03)[d]		
12	0.00	± 0.00	0.00	± 0.00	0.13	± 0.10	0.00	± 0.00
13	0.51	± 0.41	0.55	± 0.36	0.38	± 0.23	0.84	± 0.46
14	0.00	± 0.00	0.00	± 0.00	0.03	± 0.11	0.00	± 0.00
15	0.00	± 0.00	0.00	± 0.00	0.09	± 0.16	0.00	± 0.00
16	0.33	± 0.41	0.18	± 0.28	0.62	± 0.53	0.35	± 0.45
17	0.10	± 0.08	0.07	± 0.05	2.04	± 1.49	0.19	± 0.16
18	0.00	± 0.00	0.01	± 0.04	0.00	± 0.00	0.01	± 0.04
19	0.98	± 0.32	0.89	± 0.26	0.50	± 0.12	0.82	± 0.18
20	<0.01	±<0.01	0.00	± 0.00	<0.01	±<0.01	0.00	± 0.00
21	<0.01	± 0.01	0.13	± 0.22	0.02	± 0.02	0.03	± 0.04
22	0.14	± 0.10	0.22	± 0.15	1.02	± 0.32	0.36	± 0.23
23	0.13	± 0.31	0.00	± 0.00	0.64	± 0.44	0.00	± 0.00
24	0.00	± 0.00	0.00	± 0.00	<0.01	±<0.01	0.00	± 0.00
25	0.28	± 0.24	0.14	± 0.15	0.59	± 0.39	0.14	± 0.04

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[a] Values in parentheses exclude data from the 11/16/87, 1/12/88, and 2/25/88 tests.

[b] Values in parentheses exclude data from the 1/26/88 tests.

[c] Values in parentheses exclude data from 2/4/88 test.

[d] Values in parentheses exclude data from 1/5/88 test.

hydrocarbon emissions were also higher for the afternoon tests (after the 3-hour soak) than for the morning tests. After the 2500 rpm conditioning step, the hydrocarbons were similar for the morning and afternoon tests.

Test data for Vehicle 02 were much higher on the last two test days than on previous test days. The owner of Vehicle 02 indicated that after the test program was completed, driveability problems were noted which were corrected by replacing the spark plugs and one spark plug wire. The increase in hydrocarbons during the last two test days was likely related to this problem. Averages and standard deviations without the last two test points have been included in Table 3 in parentheses. Test data for Vehicle 16 were also much higher on two particular test days than on remaining test days; however, no component failure was noted during this period. Averages and standard deviations excluding these two test days are included in Table 3. Data have also been included in Table 3 excluding unexplained outliers in the test results for Vehicles 02 and 11.

B. HC Emissions - Idle

The hydrocarbon emissions at idle were also averaged for each vehicle and test point, with the averages and standard deviations presented in Table 4. Data plots are included in Appendix G (hydrocarbons on 0-200 ppm scale) for all vehicles and in Appendix H (hydrocarbons on larger scale) for Vehicles 01, 10, 13, 17, 19, 22, and 23. The idle hydrocarbon emissions followed the same general trends as the 2500 rpm hydrocarbon emissions, with reductions after conditioning and higher emissions for the test following the three-hour soak. As was the case for the 2500 rpm results, Vehicle 09 showed an increase in emissions after conditioning; however, in this case, the increase occurred during the afternoon testing. Idle emission averages were similar to the 2500 rpm emissions for a number of the cars, but Vehicles 01, 13, 19, 22, and 23 had higher idle emissions than 2500 rpm emissions. Averages and standard deviations excluding atypical emission results for Vehicles 03, 10, and 14 are included in Table 4.

C. CO Emissions - 2500 rpm

Average carbon monoxide emissions for the 2500 rpm tests are presented in Table 5. Plots of the data are found in Appendix I (carbon monoxide on 0-2 percent scale) for all 25 vehicles, and in Appendix J (carbon monoxide on larger scale) for Vehicles 03, 05, 06, 09, and 16. Carbon monoxide emissions for a number of the vehicles (01, 07, 14, 17, 18, and 20) were low under all conditions (less than 0.05 percent) and no definite trends could be observed. The majority of the vehicles had low morning carbon monoxide emissions, both before and after conditioning, and noticeably higher emissions after the three-hour soak period (Vehicles 02, 04, 05, 06, 08, 11, 12, 17, 19, 21, 22, and 23). The 2500 rpm conditioning returned the carbon monoxide emissions of these vehicles to (or near) the morning levels. Four of the vehicles (03, 09, 10, and 13) gave overall carbon monoxide emission increases with the 2500 rpm conditioning step. The carbon monoxide emissions for these vehicles were extremely variable, with standard deviations near the average value.

D. CO Emissions - Idle

Average carbon monoxide emissions for the idle tests are presented in Table 6, and plots of the data are displayed in Appendix K (carbon monoxide on 0-2 percent scale) for all 25 vehicles and Appendix L (carbon monoxide on a larger scale) for Vehicles 09 and 17. As was the case for the CO 2500 rpm emissions, many of the vehicles had low idle CO emissions under all conditions, or had higher emissions for the tests after the three-hour soak which returned to morning levels after the 2500 rpm conditioning. Five of the vehicles (03, 09, 13, 19, and 21) had overall carbon monoxide emission increases after the 2500 rpm conditioning step. In general, the carbon monoxide emissions were variable, with standard deviations near the average value.

APPENDIX A

OUTSIDE AIR TEMPERATURES DURING EACH TEST DAY

TABLE A-1. OUTSIDE AIR TEMPERATURES DURING EACH TEST DAY

Date (1987)	Temperature, °F Morning	Noon
11/5	--*	82
11/6	63	77
11/9	55	64
11/10	51	52
11/11	35	60
11/12	39	66
11/13	56	66
11/16	55	66
11/17	52	68
11/18	58	70
11/19	45	58
11/23	71	75
11/24	74	75
11/25	57	63
11/30	48	64
12/1	46	59
12/2	53	66
12/3	55	68
12/7	55	69
12/8	53	66
12/9	54	65
12/10	60	71
12/11	56	75
12/14	52	50
12/15	37	47
12/16	40	56
12/17	51	54
12/21	52	54
12/22	52	63
12/23	56	60
12/28	40	53
12/29	42	41
12/30	40	47
12/31	42	70

Date (1988)	Temperature °F Morning	Noon
1/4	37	55
1/5	46	49
1/6	45	50
1/7	42	51
1/11	38	48
1/12	48	56
1/13	47	51
1/14	45	52
1/18	58	64
1/19	48	69
1/20	42	49
1/21	33	54
1/25	39	63
1/26	33	68
1/27	41	69
1/28	48	63
2/1	69	72
2/2	55	55
2/3	53	53
2/4	44	42
2/5	40	43
2/8	46	56
2/9	52	62
2/10	55	66
2/11	31	40
2/12	39	55
2/15	50	58
2/16	50	66
2/17	65	66
2/18	60	53
2/19	44	61
2/22	49	71
2/23	52	71
2/24	50	70
2/25	50	68
2/26	60	65
2/29	66	76

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*Data not available.

APPENDIX B

SUMMARY OF TEST INFORMATION

Table B-	Vehicle No.	Vehicle Make and Model
1	01	Mercury Zephyr
2	02	Dodge Ramcharger
3	03	Oldsmobile Delta 88
4	04	Chevrolet Silverado
5	05	Honda Civic
6	06	Honda Accord
7	07	Jeep Cherokee
8	08	Peugeot 505
9	09	Volkswagen Golf
10	10	BMW 318i
11	11	Nissan Pulsar
12	12	Chevrolet Suburban
13	13	Ford Ranger
14	14	Oldsmobile Cutlass Supreme
15	15	Hyundai Excel GLS
16	16	Ford Tunderbird
17	17	Ford E-150 Van
18	18	Chevrolet Caprice Classic
19	19	Chevrolet Cavalier
20	20	Buick LeSabre
21	21	Volkswagen Scirocco
22	22	Chevrolet Astro Van
23	23	Nissan Pulsar
24	24	Buick Century
25	25	Volvo 240 DL

TABLE B-1. SUMMARY OF TEST INFORMATION - VEHICLE NO. 01

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/13	01	—	F	01	—	3:35
11/16	01	—	1/2	01	—	3:50
11/25	02	—	F	02	-	3:25
12/3	02	—	1/2	02	—	3:30
12/17	02	—	7/8	02	—	3:15
12/22	02	—	1/4	02	—	3:35
12/30	01	—	3/8	01	—	3:15
1/4	01	--	F	01	--	3:15
1/12	02	4*	3/4	02	—	3:15
1/18	01	—	7/8	01	—	3:30
1/27	02	-	1/2	02	—	3:10
2/9	02	—	7/8	02	—	3:30
2/17	02	—	1/4	02	—	3:10
2/25	01	--	3/4	01	--	3:10
2/29	01	—	3/4	01	—	3:35

---

*Primarily idle-in-neutral except when moving forward in line. No accessories operating.

TABLE B-2. SUMMARY OF TEST INFORMATION - VEHICLE NO. 02

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/12	02	—	1/2	02	—	3:30
11/18	02	—	1/4	02	—	3:15
11/24	01	—	1/2	01	—	3:15
11/30	01	—	1/2	01	—	3:30
12/9	02	--	1/2	02	--	3:30
12/15	02	--	1/2	02	--	3:10
1/6	02	—	1/2	02	—	3:35
1/11	01	—	1/4	01	—	3:35
1/21	01	—	—	01	—	4:35*
1/26	02	5**	1/4	02	—	3:20
2/3	01	—	1/4	01	—	3:15
2/8	02	—	1/4	02	—	3:30
2/16	02	—	1/2	02	—	3:20
2/26	01	—	1/2	01	—	3:20
2/29	01	—	1/4	01	—	3:40

---

*PM Test conducted at 12:30 PM.

**Primarily idle-in-neutral except when moving forward in line. Heater operating.

TABLE B-3. SUMMARY OF TEST INFORMATION - VEHICLE NO. 03

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/11	02	—	1/2	02	—	3:15
11/16	—	5*	1/2	—	—	3:25
11/24	02	—	1/2	02	—	3:45
12/3	01	—	1/2	01	—	3:30
12/7	02	—	3/4	02	—	3:45
12/16	02	—	1/8	02	—	5:45**
12/21	01	—	1/4	01	—	4:00
12/29	01	3***	1/2	01	—	3:45
1/7	01	—	1/2	02	—	4:05
1/13	01	—	1/4	01	—	3:05
1/18	02	—	1/2	02	—	3:30
1/26	01	—	F	01	—	3:45
2/4	02	12***	3/4	02	—	3:15
2/12	02	7*	3/4	02	—	3:45
2/8	02	5*	3/4	02	—	3:15

---

*Primarily idle-in-neutral except when moving forward in line. No accessories operating.

**PM Test conducted at 1:30 PM

***Primarily idle-in-neutral except when moving forward in line. Heater operating.

TABLE B-4. SUMMARY OF TEST INFORMATION - VEHICLE NO. 04

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/11	01	—	1/2	01	—	3:30
11/19	01	—	1/4	01	—	3:25
11/23	01	—	1/2	01	—	4:20
12/1	01	—	1/4	01	—	3:45
12/11	02	—	1/2	02	—	3:35
12/16	02	—	1/4	02	—	5:20*
12/21	01	—	3/4	01	—	4:05
1/5	01	—	1/4	01	—	3:20
1/14	02	—	7/8	01	—	3:55
1/19	01	—	3/4	01	—	3:30
1/27	02	—	1/2	02	—	3:40
2/1	02	5**	1/4	02	—	3:50
2/11	01	—	3/4	02	—	3:35
2/17	02	—	1/4	02	—	4:00
2/23	01	—	3/8	01	—	3:35

---

*PM Test conducted at 1:16 PM

**Primarily engine off. Restarted and advanced in line as necessary. No accessories operating.

TABLE B-5. SUMMARY OF TEST INFORMATION - VEHICLE NO. 05

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/10	01	5*	1/2	01	—	3:10
11/18	02	—	3/4	02	—	3:45
11/23	02	—	1/2	02	—	3:45
12/2	02	—	3/4	02	—	3:30
12/10	02	1**	1/4	02	—	3:30
12/17	02	—	3/4	02	—	3:15
12/29	01	—	1/4	01	—	3:30
1/4	02	—	F	02	—	3:30
1/12	02	—	1/2	02	—	3:30
1/20	02	—	1/2	02	—	3:30
1/25	02	—	1/2	02	—	3:30
2/4	02	8*	3/4	02	—	3:35
2/8	02	—	1/2	02	—	3:25
2/16	02	—	3/4	02	—	3:25
2/24	01	—	F	01	—	3:15

---

*Primarily idle-in-neutral except when moving forward in line. Heater operating.

**Primarily idle-in-neutral except when moving forward in line. No accessories operating.

TABLE B-6. SUMMARY OF TEST INFORMATION - VEHICLE NO. 06

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/11	02	—	1/2	02	—	3:25
11/18	02	—	3/4	02	—	3:30
11/25	02	—	1/2	02	—	3:30
12/3	02	—	3/4	02	—	3:30
12/7	02	—	1/2	02	—	3:40
12/15	02	—	3/4	02	—	3:20
12/23	02	1*	F	02	—	3:20
12/28	02	3**	3/4	01	—	3:30
1/5	02	—	3/4	02	—	3:30
1/11	02	—	1/2	02	—	3:25
1/19	02	—	3/4	02	—	3:30
1/28	02	—	F	02	—	3:30
2/3	02	—	F	02	—	3:30
2/9	02	4**	F	02	—	3:30
2/19	02	—	3/4	02	—	3:25

---

*Primarily idle-in-neutral except when moving forward in line. No accessories operating.

**Primarily idle-in-neutral except when moving forward in line. Heater operating.

TABLE B-7. SUMMARY OF TEST INFORMATION - VEHICLE NO. 07

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/10	02	15*	1/2	02	—	3:15
11/18	01	—	1/2	01	5**	3:30
11/25	01	—	3/4	01	—	3:10
11/30	01	—	1/4	01	5***	3:30
12/10	02	—	1/4	02	—	3:00
12/17	01	—	—	01	—	3:25
12/21	01	—	—	01	—	3:15
12/29	01	—	1/4	01	—	3:15
1/6	01	—	—	02	4***	3:15
1/12	01	—	—	01	—	3:05
1/28	01	—	1/2	01	2***	3:05
2/10	02	—	1/4	02	—	3:25
2/15	02	7+	3/4	02	—	3:15
2/24	01	—	1/2	01	—	3:20
2/29	01	—	1/2	01	—	3:15

---

*Primarily engine off. Restarted and advanced in line as necessary. No accessories operating.

**Primarily idle-in-drive except when moving forward in line. A/C operating.

***Primarily idle-in-drive except when moving forward in line. No accessories operating.

+Primarily idle-in-drive except when moving forward in line. Heater operating.

TABLE B-8. SUMMARY OF TEST INFORMATION - VEHICLE NO. 08

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/18	01	—	1/2	01	—	3:40
11/24	02	—	1/2	02	—	3:45
11/30	02	—	1/8	02	—	3:15
12/8	02	—	5/8	02	—	3:25
12/14	02	—	3/8	02	—	3:25
12/23	02	—	3/8	02	—	3:15
12/31	01	—	1/2	01	—	3:25
1/7	01	—	1/2	01	—	3:25
1/11	02	—	1/8	02	—	3:25
1/19	02	—	5/8	02	—	3:30
1/28	01	—	1/4	01	—	3:15
2/3	02	2*	E	02	—	3:25
2/10	02	—	1/2	02	—	3:15
2/15	02	4*	1/8	02	—	3:35
2/23	01	—	E	01	-	3:15

---

*Primarily idle-in-neutral except when moving forward in line. No accessory operating.

TABLE B-9. SUMMARY OF TEST INFORMATION - VEHICLE NO.09

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/19	02	—	3/4	02	—	3:30
11/23	02	-	1/2	02	—	3:40
12/1	02	—	E	02	—	3:10
12/9	02	—	3/8	02	—	3:15
12/17	01	—	F	01	—	3:25
12/21	02	—	—	02	—	4:00
12/30	01	—	F	01	—	3:15
1/5	02	—	1/2	02	—	3:25
1/13	02	—	1/2	02	—	3:10
1/18	01	2*	1/8	01	—	3:55
1/26	01	6*	5/8	01	—	3:20
2/2	01	—	1/4	01	—	3:25
2/9	02	7*	7/8	02	—	3:30
2/17	02	—	1/4	02	—	3:10
2/25	01	—	3/8	01	—	3:15

---

*Primarily idle-in-neutral except when moving forward in line. Heater operating.

**Primarily idle-in-neutral except when moving forward in line. No accessories operating.

TABLE B-10. SUMMARY OF TEST INFORMATION - VEHICLE NO. 10

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/11	01	—	F	02	—	3:45
11/16	02	—	F	02	—	3:40
11/24	02	—	1/2	02	—	3:55
12/1	02	—	1/2	02	—	3:40
12/10	02	—	F	02	—	4:20
12/14	02	—	1/2	02	—	3:25
12/21	02	—	3/4	02	—	3:45
12/30	02	—	1/2	02	—	3:30
1/7	02	—	1/4	02	—	3:25
1/12	01	—	1/4	01	—	3:25
1/20	01	—	F	01	—	3:40
1/27	02	—	F	02	—	3:40
2/4	02	1*	F	02	—	3:55
2/9	02	—	1/4	02	—	3:25
2/15	02	—	1/2	02	—	3:25

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*Waiting condition not recorded.

TABLE B-11. SUMMARY OF TEST INFORMATION - VEHICLE NO. 11

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/12	02	—	1/2	02	—	2:55*
11/16	01	—	1/4	01	—	3:45
11/25	01	—	1/4	01	—	3:55
12/1	02	—	1/2	02	—	3:30
12/11	02	—	1/4	02	—	3:15
12/14	02	—	1/4	02	—	3:15
12/21	02	—	1/4	02	—	3:20
1/5	01	—	1/2	01	—	3:35
1/13	02	—	1/4	02	—	3:25
1/21	02	—	1/2	02	—	3:40
1/27	01	—	1/2	01	—	3:45
2/2	02	—	1/4	01	—	3:20
2/12	02	—	1/4	02	—	3:50
2/18	02	—	1/2	02	—	3:40
2/22	02	5**	1/4	01	—	3:55***

---

*Soak period inadvertently 5 minutes short.

**Primarily idle-in-neutral except when moving forward in line. No accessories operating.

***Vehicle was operated after AM test, soaked 3 hours and 55 minutes, and tested at 2:25 PM.

TABLE B-12. SUMMARY OF TEST INFORMATION - VEHICLE NO. 12

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/12	02	—	1/4	02	—	4:00
11/17	01	—	1/2	01	—	3:40
11/25	02	—	1/2	02	—	4:25
11/30	—*	--	1/4	--*	--	4:15
12/8	02	—	1/2	02	—	4:35
12/14	02	—	1/8	02	—	3:30
12/23	01	—	1/4	01	—	4:05
12/31	01	—	1/4	01	—	4:15
1/6	01	—	1/8	01	—	3:45
1/11	01	—	3/4	01	—	3:40
1/19	01	—	1/4	01	—	3:55
1/28	01	—	1/2	01	—	3:20
2/1	02	—	1/4	02	—	3:35
2/9	02	—	1/8	02	—	4:45
2/17	02	—	1/2	02	—	4:40

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*Analyzer number not available.

TABLE B-13. SUMMARY OF TEST INFORMATION - VEHICLE NO. 13

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/10	01	—	F	01	—	4:00
11/24	02	—	1/2	02	—	3:45
12/3	01	—	7/8	01	—	3:50
12/7	01	—	—	02	—	3:50
12/16	02	—	3/4	02	—	3:35
12/22	02	10*	F	02	--	3:30
12/28	02	—	7/8	02	—	3:35
1/5	01	—	F	01	—	3:50
1/13	02	—	1/2	02	—	3:30
1/20	01	—	F	01	—	3:50
1/25	01	—	1/2	01	—	3:40
1/28	02	—	F	01	—	3:20

---

*Primarily engine off. Restarted and advanced in line as necessary. No accessories operating.

TABLE B-14. SUMMARY OF TEST INFORMATION - VEHICLE NO. 14

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/12	01	—	—	01	—	3:00
11/17	02	—	1/3	02	—	3:40
11.23	01	—	F	01	—	3:25
12/2	01	—	1/4	01	—	3:25
12/8	02	—	3/4	02	—	3:05
12/16	01	—	1/4	01	—	4:30*
12/22	01	—	3/4	01	—	3:40
12/28	01	—	1/8	01	—	3:45
1/4	01	—	3/4	01	—	3:20
1/13	01	—	1/4	01	—	3:15
1/21	01	—	3/4	01	—	3:20
1/28	02	—	1/4	02	—	3L10
2/1	02	—	F	02	—	3:30
2/10	02	—	1/4	02	—	3:15
2/19	02	—	3/4	02	—	3:45

---

*PM Test conducted at 12:49 PM.

TABLE B-15. SUMMARY OF TEST INFORMATION - VEHICLE NO.15

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/11	02	1*	1/2	02	—	3:55
11/17	02	—	3/4	02	—	3:40
11/25	02	—	1/2	02	—	3:35
12/3	02	5*	F	02	—	3:35
12/7	02	4*	1/2	02	—	4:30**
12/16	01	—	3/4	01	—	5:25**
12/23	01	—	1/4	01	—	3:10
12/29	02	—	1/4	02	—	3:30
1/4	02	—	1/2	02	2*	3:25
1/14	01	—	1/2	01	—	3:30
1/19	02	—	1/2	02	—	3:25
1/25	02	2*	F	02	—	3:35
2/9	02	—	1/4	02	—	4:00
2/15	02	8*	1/4	02	—	3:45
2/25	01	—	1/2	01	—	3:10

---

*Primarily idle-in-neutral except when moving forward in line. No accessories operating.

**PM test conducted at 12:30 PM

**PM test conducted at 1:26 PM

TABLE B-16. SUMMARY OF TEST INFORMATION - VEHICLE NO. 16

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/12	01	—	3/4	01	4*	3:45
11/18	01	3**	3/4	01	--	3:55
11/24	01	—	1/4	01	—	3:45
11/30	02	—	3/4	02	—	3:30
12/7	01	—	1/4	02	—	4:05
12/17	01	—	3/4	01	—	3:25
12/22	02	—	1/4	02	5*	3:30
1/6	01	—	F	01	—	3:40
1/12	01	—	3/4	01	—	3:25
1/21	01	—	1/4	01	—	3:30
1/25	01	—	1/2	01	—	3:55
2/2	02	—	1/4	02	—	4:00
2/10	02	—	1/2	02	—	4:25
2/16	02	2**	3/4	02	--	3:55
2/22	02	—	1/4	02	—	3:20

---

*Primarily engine off. Restarted and advanced in line as necessary. No accessories operating.

**Primarily idle-in-neutral except when moving forward in line. No accessories operating.

TABLE B-17. SUMMARY OF TEST INFORMATION - VEHICLE NO. 17

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/13	—	10*	3/4	--	--	3:05
11/18	02	—	3/4	02	—	3:30
11/23	02	—	1/4	02	—	3:40
11/30	02	—	1/2	02	—	3:10
12/8	02	—	F	02	—	3:55
12/17	02	—	1/4	02	—	3:20
12/23	02	—	3/4	02	—	3:20
12/30	02	—	1/2	02	—	3:15
1/5	02	—	1/4	02	—	3:25
1/11	02	—	1/2	02	—	3:30
1/20	02	—	1/2	02	—	3:10
1/26	02	5**	1/4	02	--	3:35
2/5	02	—	1/2	02	—	3:30
2/11	02	—	F	02	—	3:30
2/18	02	—	F	02	—	3:40

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*Primarily engine off. Restarted and advanced in line as necessary. No accessories operating.

**Primarily idle-in-neutral except when moving forward in line. No accessories operating.

TABLE B-18. SUMMARY OF TEST INFORMATION - VEHICLE NO. 18

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/10	01	9*	1/4	01	—	3:30
11/18	01	—	F	01	—	4:30
11/23	01	—	1/2	01	—	3:40
12/1	01	—	5/8	01	—	3:35
12/9	02	—	1/8	02	—	3:35
12/16	01	—	1/2	01	—	3:05
12/22	01	—	1/4	01	—	3:55
12/28	01	—	1/4	01	—	4:05
1/7	01	—	3/8	01	—	3:35
1/14	02	—	5/8	02	—	3:35
1/18	01	—	3/4	01	—	3:45
1/27	02	—	1/2	01	—	4:00
2/4	02	—	5/8	02	—	3:20
2/9	02	—	3/4	02	—	3:20
2/18	02	—	F	02	—	3:40

---

*Primarily idle-in-neutral except when moving forward in line. No accessories operating.

TABLE B-19. SUMMARY OF TEST INFORMATION - VEHICLE NO. 19

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/12	01	—	1/4	01	—	3:55
11/16	01	—	1/2	01	—	3:45
11/23	02	—	1/8	02	—	3:40
12/2	01	—	1/4	01	—	3:15
12/8	02	—	1/4	02	—	3:50
12/17	01	—	1/2	01	—	3:30
12/21	02	—	1/4	02	—	3:45
12/30	01	—	1/2	01	—	4:00
1/5	01	—	1/8	01	—	3:50
1/13	01	—	1/4	01	—	3:20
1/21	02	3*	1/2	02	—	3:50
1/26	01	—	1/4	01	—	3:40
2/1	02	3*	1/2	02	—	3:30
2/9	02	—	1/4	02	—	3:25
2/19	02	—	1/8	02	—	3:35

---

*Primarily idle-in-neutral except when moving forward in line. No accessories operating.

TABLE B-20. SUMMARY OF TEST INFORMATION - VEHICLE NO. 20

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/13	02	—	5/8	02	1*	3:30
11/16	01	—	1/8	01	—	3:50
12/1	01	—	1/4	01	—	3:40
12/9	02	—	1/4	02	—	3:40
12/15	02	—	1/8	02	—	3:10
12/23	01	—	1/8	01	—	3:15
12/31	01	—	F	01	—	3:30
1/4	01	—	1/2	01	—	3:40
1/14	01	—	3/8	01	—	3:35
1/18	01	—	F	01	2*	3:35
1/27	02	1*	F	02	—	3:25
2/5	02	—	1/8	02	—	3:30
2/11	02	—	—	02	—	3:30
2/17	02	—	F	02	3*	3:25
2/26	01	—	7/8	01	—	3:20

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*Primarily idle-in-neutral except when moving forward in line. No accessories operating.

TABLE B-21. SUMMARY OF TEST INFORMATION - VEHICLE NO. 21

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/24	01	—	1/2	01	—	3:35
12/7	02	—	3/4	02	—	3:05
12/29	02	—	1/4	02	—	3:20
1/7	02	—	F	02	—	3:25
1/14	02	2*	F	02	—	3:35
1/19	01	—	1/2	01	—	3:05**
1/25	02	2*	1/8	02	—	3:20
2/5	02	5*	1/4	02	—	3:35
2/8	02	—	1/4	02	—	3:20
2/12	02	—	F	02	—	3:00***
2/15	02	—	1/2	02	—	3:50
2/19	02	—	F	02	—	3:15
2/23	01	—	—	01	—	3:10
2/26	01	—	1/2	01	—	3:15
2/29	01	—	F	01	—	3:25

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*Primarily engine off. Restarted and advanced in line as necessary. No accessories operating.

**AM test conducted at 5:06 AM, test after soak conducted at 8:13 AM.

***Vehicle was operated after test, soaked for 3 hours, and tested at 2:31 PM.

TABLE B-22. SUMMARY OF TEST INFORMATION - VEHICLE NO. 22

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/10	01	3*	1/2	01	—	3:40
11/19	01	—	1/2	01	—	3:20
11/24	01	—	3/4	01	—	3:55
12/2	01	—	1/4	01	—	4:10
12/10	02	—	1/4	02	—	4:20
12/14	02	10*	3/4	02	—	3:40
12/23	01	—	1/2	01	—	3:10
1/6	01	—	1/2	01	—	3:40
1/12	02	—	7/8	02	—	3:40
1/18	02	5*	3/4	02	—	4:00
1/25	01	—	3/4	01	—	3:30
2/4	02	9**	3/4	02	—	4:05
2/12	02	4**	1/4	02	—	4:00
2/19	02	—	3/4	02	—	3:25
2/24	01	—	1/4	01	—	3:20

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*Primarily idle-in-neutral except when moving forward in line. No accessories operating.

**Primarily idle-in-neutral except when moving forward in line. Heater operating.

TABLE B-23. SUMMARY OF TEST INFORMATION - VEHICLE NO. 23

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/11	01	—	3/4	01	—	3:40
11/19	01	—	3/4	01	—	3:50
11/24	01	—	3/4	01	—	4:00
11/30	01	—	3/4	01	—	3:45
12/11	02	—	5/8	02	—	3:45
12/15	02	—	1/2	02	—	4:15
12/21	01	—	3/4	01	—	3:45
12/30	01	—	1/4	01	—	3:35
1/6	01	—	1/2	01	—	3:45
1/14	01	—	1/2	01	—	4:15
1/19	01	—	1/2	01	—	3:45
1/27	02	—	1/4	02	—	3:50
2/2	01	—	3/4	01	—	3:30
2/12	02	—	3/4	02	—	3:50
2/15	02	—	1/2	02	—	3:30

TABLE B-24. SUMMARY OF TEST INFORMATION - VEHICLE NO. 24

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/17	01	—	F	01	—	4:00
11/23	01	—	1/4	01	—	3:35
12/2	02	—	1/2	02	—	3:45
12/11	02	—	1/8	02	—	3:40
12/16	02	—	1/2	02	—	5:50*
12/22	01	—	F	01	—	4:05
12/28	01	—	3/4	01	—	3:20
1/7	01	—	1/8	01	5**	3:30
1/14	01	—	3/8	01	—	3:45
1/20	01	—	3/4	01	—	3:30
1/26	02	4**	1/8	02	—	3:25
2/4	02	11**	1/4	02	—	3:40
2/12	02	6**	F	02	—	3:55
2/16	02	3**	1/2	02	—	3:20
2/22	02	—	5/8	02	—	3:25

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*PM test conducted at 1:54 PM.

**Primarily idle-in-drive except when moving forward in line. No accessories operating.

TABLE B-25. SUMMARY OF TEST INFORMATION - VEHICLE NO. 25

Test Date	Analyzer No. AM Test	Waiting Period AM Test, Min.	Fuel Gauge Reading	Analyzer No. Noon Test	Waiting Period Noon Test, Min.	Soak Period Hr:Min.
11/13	01	—	1/4	01	5*	3:45
11/17	01	5*	1/4	01	—	3:25
12/3	01	—	1/2	01	—	3:35
12/7	02	—	F	02	—	3:30
12/15	02	4*	3/4	02	—	3:25
12/22	01	—	1/2	01	—	3:30
12/28	02	—	3/4	02	—	3:35
1/8	01	—	1/4	01	—	3:20
1/13	01	—	1/4	01	—	3:30
1/21	02	—	1/2	02	—	3:50
1/28	02	—	3/4	02	—	3:15
2/3	01	—	F	01	—	3:40
2/10	02	3*	F	02	—	3:25
2/16	02	—	1/2	02	—	3:25
2/26	01	—	1/4	01	—	3:20

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*Primarily idle-in-neutral except when moving forward [illegible] line. No accessories operating.

APPENDIX C

ENGINE AND EXHAUST MAINTENANCE AND ANALYZER COMMENTS

TABLE C-1. ENGINE AND EXHAUST MAINTENANCE AND ANALYZER OPERATOR COMMENTS

Vehicle #1

11/16/87 - Replaced water pump which involved removing drive belt from air pump and alternator and reinstalling belts after water pump was replaced.

12/3/87 - Added 1 quart of water to cooling system.
2/25/88 - Added 2 quarts of oil.

Vehicle #2

1/6/88 - Added oil. Replaced water pump and spark plugs.

Vehicle #3

1/26/88 - Oil Change - Pennzoil 10W-30, 5 quarts.

Vehicle #4

No maintenance done.

Vehicle #5

11/18/88 - Car stalled as it was pulled into stall. Immediate restart and proceeded as normal.

Vehicle #6

12/7/87 - Oil change.
12/28/87 - After first 2500 rpm test, had to depress gas pedal slightly to bring rpm below 1300 rpm.

Vehicle #7

1/6/88 - Changed oil and filter.

Vehicle #8

12/23/87 - Oil change.
2/15/88 - Repalced radiator.

Vehicle #9

No maintenance done.

Vehicle #10

1/5/88 - Replaced core.
1/8/88 - Replaced fuel pump relay.

TABLE C-1 (CONT'D). ENGINE AND EXHAUST MAINTENANCE AND ANALYZER OPERATOR COMMENTS

Vehicle #11

No maintenance done.

Vehicle #12

1/19/88 - Changed belts.
1/28/88 - Added 1 quart oil.

Vehicle #13

1/20/88 - Oil and filter change.

Vehicle #14

No maintenance done.

Vehicle #15

No maintenance done.

Vehicle #16

2/16/88 - Changed 1 spark plug and spark plug wires.

Vehicle #17

11/18/87 - Oil and filter change.

Vehicle #18

12/1/87 - Changed freeze plugs.

Vehicle #19

11/16/87 - 1 quart oil added.
1/26/88 - Oil change, new air filter, new fluid in rear axle.

Vehicle #20

12/1/87 - Added 1/2 quart oil at 7,771 miles.
1/14/88 - Oil change and filter.

Vehicle #21

12/2/87 - Oil change.
1/7/88 - Oil change; replaced water pump.
1/25/88 - Crack repaired in tailpipe.

TABLE C-1 (CONT'D). ENGINE AND EXHAUST MAINTENANCE AND ANALYZER OPERATOR COMMENTS

Vehicle #22

No maintenance done.

Vehicle #23

No maintenance done.

Vehicle #24

No maintenance done.

Vehicle #25

2/3/88 - Added 1 quart of oil.

APPENDIX D

I/M TEST RESULTS

Table D-	Vehicle No.	Vehicle Make and Model
1	01	Mercury Zephyr
2	02	Dodge Ramcharger
3	03	Oldsmobile Delta 88
4	04	Chevrolet Silverado
5	05	Honda Civic
6	06	Honda Accord
7	07	Jeep Cherokee
8	08	Peugeot 505
9	09	Volkswagen Golf
10	10	BMW 318i
11	11	Nissan Pulsar
12	12	Chevrolet Suburban
13	13	Ford Ranger
14	14	Oldsmobile Cutlass Supreme
15	15	Hyundai Excel GLS
16	16	Ford Tunderbird
17	17	Ford E-150 Van
18	18	Chevrolet Caprice Classic
19	19	Chevrolet Cavalier
20	20	Buick LeSabre
21	21	Volkswagen Scirocco
22	22	Chevrolet Astro Van
23	23	Nissan Pulsar
24	24	Buick Century
25	25	Volvo 240 DL

TABLE D-1.

MAKE	MERCURY	MODEL	ZEPHYR
TRANSMISSION	A-3	MODEL YR	1982
VIN	1MEBP71B7CK632918	ENG DISP	3.3 L
PROJECT VEHICLE NO	01	ENG FAMILY	CFM3.3V1GXF9

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/13/87	41429	19	.00	71	.00	9	.00	71	.00	77	.11	207	.03	15	.00	132	.00
11/16/87	41526	87	.18	278	2.58	15	.00	132	.00	28	.00	85	.00	15	.00	82	.00
11/25/87	41753	27	.00	94	.00	14	.00	59	.00	18	.00	84	.00	14	.00	77	.00
12/ 3/87	41996	21	.00	69	.00	9	.00	72	.00	57	.00	77	.00	13	.00	68	.00
12/17/87	42243	16	.00	100	.00	8	.00	77	.00	18	.00	93	.00	10	.00	77	.00
12/22/87	42355	17	.00	111	.00	7	.00	75	.00	42	.01	75	.00	9	.00	75	.00
12/30/87	42636	13	.00	90	.00	4	.00	78	.00	39	.01	92	.00	5	.00	87	.00
1/ 4/88	42846	7	.00	65	.00	3	.00	72	.00	27	.00	79	.00	7	.00	72	.00
1/12/88	43075	57	.05	240	1.72	8	.00	115	.00	28	.00	104	.00	11	.00	77	.00
1/18/88	43259	22	.00	165	.07	4	.00	98	.00	21	.00	89	.00	4	.00	74	.00
1/27/88	43534	9	.00	62	.00	5	.00	60	.00	13	.00	60	.01	9	.00	68	.00
2/ 9/88	43848	11	.01	70	.00	5	.00	78	.00	32	.00	95	.00	9	.00	80	.00
2/17/88	44109	17	.00	68	.00	6	.00	75	.00	30	.00	137	.00	7	.00	79	.00
2/25/88	44394	32	.03	237	1.35	2	.00	83	.00	23	.03	88	.01	6	.00	72	.00
2/29/88	44522	16	.00	69	.00	6	.00	75	.00	44	.03	48	.01	8	.00	72	.00

TABLE D-2.

MAKE	DODGE	MODEL	RAMCHARGER
TRANSMISSION	A-3	MODEL YR	1984
VIN	1B4GD12W4ES367521	ENG DISP	5.9 L
PROJECT VEHICLE NO	02	ENG FAMILY	ECR5.9T4B4F9

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/12/87	33101	9	.00	14	.00	8	.00	12	.00	56	1.20	42	.74	10	.00	13	.00
11/18/87	33234	10	.00	13	.00	6	.00	8	.00	76	1.24	60	1.12	8	.00	11	.00
11/24/87	33330	5	.00	11	.00	3	.00	5	.00	72	1.47	49	.87	7	.00	9	.00
11/30/87	33482	4	.00	14	.00	5	.00	6	.00	57	1.40	51	1.01	8	.00	10	.00
12/ 3/87	33720	10	.00	18	.00	7	.00	11	.00	35	.68	46	.32	11	.00	13	.00
12/15/87	33871	10	.00	15	.00	7	.00	9	.00	39	1.00	34	.51	8	.00	10	.00
1/ 6/88	36315	25	.01	29	.00	25	.00	28	.00	48	.50	47	.03	20	.00	28	.00
1/11/88	36412	17	.06	34	.00	20	.04	33	.00	34	.34	35	.01	23	.03	32	.00
1/21/88	36641	9	.05	52	.01	31	.05	44	.00	68	.37	48	.04	33	.03	34	.00
1/26/88	36764	32	.03	40	.00	30	.02	25	.00	55	.06	35	.00	27	.01	28	.00
2/ 3/88	36902	28	.05	35	.00	28	.03	30	.00	47	.79	43	.09	33	.03	27	.00
2/ 8/88	37028	49	.03	24	.00	54	.01	24	.00	48	.59	31	.06	32	.00	31	.00
2/16/88	37244	19	.05	35	.00	25	.02	24	.00	55	.16	36	.01	33	.02	25	.00
2/26/88	37486	502	.04	31	.00	222	.02	22	.00	383	.46	39	.07	505	.02	27	.00
2/29/88	37559	553	.04	34	.00	174	.01	26	.00	526	.32	42	.18	469	.02	25	.00

TABLE D-3.

MAKE	OLDSMOBILE	MODEL	DELTA 88
TRANSMISSION	A-4	MODEL YR	1984
VIN	1G3AN69Y4EX393534	ENG DISP	5.0 L
PROJECT VEHICLE NO	03	ENG FAMILY	E365.0V4NLAX

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/11/87	40931	28	.00	21	.00	16	.00	16	.00	150	1.79	124	.02	17	.00	21	.00
11/16/87	41214	60	.11	62	.00	16	.00	16	.00	37	.00	71	.00	19	.29	87	.21
11/24/87	41650	35	.00	29	.00	32	.37	29	.02	177	2.49	83	.03	24	.00	19	.00
12/ 3/87	42037	28	.00	31	.00	16	.00	20	.00	40	.08	86	.02	163	3.91	17	.02
12/ 7/87	42184	41	.00	33	.00	15	.00	15	.00	126	1.21	94	.00	10	.34	14	.00
12/16/87	42636	35	.00	27	.00	14	.00	14	.00	108	.46	62	.00	16	.00	12	.00
12/21/87	43012	28	.00	23	.00	12	.00	38	.02	38	.00	35	.00	5	.25	9	.01
12/29/87	43440	26	.00	28	.00	11	.00	17	.02	18	.00	41	.00	22	.34	106	.25
1/ 7/88	43951	26	.00	27	.00	17	.00	16	.00	197	.56	69	.00	17	.00	13	.00
1/13/88	44370	25	.00	37	.00	15	.00	40	.06	4	.00	12	.00	5	.23	47	.10
1/18/88	44700	30	.00	38	.00	11	.34	17	.00	136	.74	108	.00	16	.00	18	.00
1/26/88	45260	22	.00	26	.00	5	.31	93	.34	14	.00	37	.00	139	3.36	313	1.35
2/ 4/88	45900	71	.20	59	.00	11	.28	29	.13	65	1.02	278	1.22	15	.23	4	.08
2/12/88	46575	25	.00	19	.00	9	.41	18	.02	9	.00	15	.00	7	.31	22	.13
2/18/88	46950	29	.00	20	.00	59	1.26	10	.02	112	3.82	231	1.51	9	.00	10	.00

TABLE D-4.

MAKE	CHEVROLET	MODEL	SILVERADO
TRANSMISSION	A-3	MODEL YR	1985
VIN	1GCDC14H2FS120801	ENG DISP	5.0 L
PROJECT VEHICLE NO	04	ENG FAMILY	F1G5.7T4HHC0

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/11/87	30629	4	.00	3	.00	3	.00	3	.00	39	.24	67	.05	1	.00	1	.00
11/13/87	30815	2	.00	1	.00	3	.00	2	.00	30	.22	50	.04	3	.00	2	.00
11/23/87	30887	4	.00	2	.00	2	.00	0	.00	[illegible]	.24	56	.02	[illegible]	.00	0	.00
12/ 1/87	31137	1	.00	1	.00	0	.00	0	.00	42	.35	34	.01	1	.00	0	.00
12/11/87	31347	8	.00	7	.00	5	.00	4	.00	44	.42	74	.02	6	.00	11	.00
12/16/87	31430	5	.00	3	.00	3	.00	3	.00	20	.13	18	.01	6	.00	5	.00
12/21/87	31530	3	.00	2	.00	1	.00	1	.00	22	.10	30	.01	0	.00	0	.00
1/ 5/88	31853	1	.00	1	.00	0	.00	0	.00	38	.11	47	.02	0	.00	0	.00
1/14/88	32037	8	.00	8	.00	5	.00	5	.00	43	.09	48	.02	6	.00	5	.00
1/19/88	32130	0	.00	0	.00	0	.00	0	.00	30	.24	33	.02	1	.00	0	.00
1/27/88	32296	6	.00	6	.00	5	.00	6	.00	51	.14	88	.04	5	.00	5	.00
2/ 1/88	32402	9	.01	9	.00	5	.00	5	.00	45	.34	85	.02	6	.00	5	.00
2/11/88	32605	7	.00	6	.00	4	.00	3	.00	33	.09	30	.01	4	.00	4	.00
2/17/88	32728	6	.00	6	.00	4	.00	3	.00	45	.26	80	.03	3	.00	2	.00
2/23/88	32902	4	.00	6	.00	2	.00	2	.00	43	.13	53	.02	3	.00	3	.00

TABLE D-5.

MAKE	HONDA	MODEL	CIVIC
TRANSMISSION	M-4	MODEL YR	1981
VIN	JHMSL4310BS013641	ENG DISP	1.3 L
PROJECT VEHICLE NO	05	ENG FAMILY	BHN1.3V3AA5

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/10/87	77152	13	.00	3	.00	4	.00	1	.00	73	.16	99	.04	13	.00	4	.00
11/18/87	77303	11	.00	6	.00	5	.00	2	.00	125	.17	129	.04	3	.00	3	.00
11/23/87	77361	3	.00	4	.00	6	.00	3	.00	147	.23	146	.06	7	.00	4	.00
12/ 2/87	77520	10	.00	5	.00	1	.00	2	.00	71	.15	119	.05	3	.00	3	.00
12/10/87	77686	12	.00	4	.00	5	.00	2	.00	85	.22	152	.08	8	.00	6	.00
12/17/87	77800	9	.00	5	.00	5	.00	3	.00	113	.31	141	.07	6	.00	3	.00
12/29/87	77895	4	.00	0	.00	0	.00	0	.00	201	3.27	121	.08	4	.00	0	.00
1/ 4/88	77930	7	.00	5	.00	5	.00	2	.00	926	3.77	227	.18	11	.00	5	.00
1/12/88	78051	8	.00	7	.00	3	.00	2	.00	127	.47	188	.09	6	.00	4	.00
1/20/88	78330	11	.00	5	.00	3	.00	3	.00	455	3.30	191	.15	8	.00	2	.00
1/25/88	78539	11	.00	6	.00	5	.00	3	.00	87	.28	187	.10	8	.00	4	.00
2/ 4/88	78730	16	.00	6	.00	4	.00	2	.00	532	3.27	332	5.50	12	.00	3	.00
2/ 8/88	78770	8	.00	4	.00	3	.00	1	.00	122	1.62	201	.12	6	.00	2	.00
2/16/88	78905	9	.00	4	.00	4	.00	2	.00	110	.81	131	.08	9	.00	4	.00
2/24/88	79098	6	.00	1	.00	2	.00	0	.00	77	.25	158	.08	3	.00	0	.00

TABLE D-6.

MAKE	HONDA	MODEL	ACCORD
TRANSMISSION	M-5	MODEL YR	1985
VIN	JHMAD5429FC081751	ENG DISP	1.8 L
PROJECT VEHICLE NO	06	ENG FAMILY	FHN1.8V3FXF5

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/11/87	33890	1	.00	9	.00	0	.00	5	.00	167	2.22	198	.12	3	.00	10	.00
11/19/87	34149	1	.00	7	.00	0	.00	4	.00	97	1.91	98	.02	3	.00	9	.00
11/25/87	34272	1	.00	6	.00	1	.00	4	.00	115	3.36	34	.00	3	.00	8	.00
12/ 3/87	34480	1	.00	7	.00	1	.00	5	.00	112	3.00	258	.17	1	.00	8	.00
12/ 7/87	34508	2	.00	7	.00	0	.00	3	.00	106	2.62	251	.18	2	.00	8	.00
12/15/87	34699	1	.00	7	.00	1	.00	5	.00	107	2.73	19	.00	3	.00	9	.00
12/23/87	34998	2	.00	6	.00	1	.00	3	.00	59	.56	29	.00	1	.00	6	.00
12/28/87	35109	0	.00	3	.00	0	.00	0	.00	127	3.10	48	.01	0	.00	8	.00
1/ 5/88	35346	2	.00	7	.00	0	.00	3	.00	126	3.20	33	.00	3	.00	11	.00
1/11/88	35443	1	.00	7	.00	0	.00	4	.00	111	2.74	37	.00	3	.00	8	.00
1/19/88	35607	1	.00	6	.00	0	.00	3	.00	48	.55	83	.00	3	.00	7	.00
1/28/88	35742	3	.00	9	.00	0	.00	3	.00	109	2.82	38	.01	3	.00	10	.00
2/ 3/88	36160	2	.00	7	.00	0	.00	3	.00	106	2.45	170	.09	3	.00	11	.00
2/ 9/88	36264	0	.00	6	.00	0	.00	3	.00	122	3.12	16	.00	2	.00	7	.00
2/19/88	36442	1	.00	6	.00	0	.00	3	.00	116	2.63	221	.21	1	.00	7	.00

TABLE D-7.

MAKE JEEP
MODEL CHEROKEE
TRANSMISSION A-4
MODEL YR 1987
VIN 1JCMU7427HT031944
ENG DISP 4.0 L
PROJECT VEHICLE NO 07
ENG FAMILY HAMA.0T5LAB9

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/10/87	NR*	1	.00	2	.00	0	.00	0	.00	7	.07	12	.01	0	.00	0	.00
11/18/87	13156	0	.00	0	.00	0	.00	0	.00	0	.00	0	.00	0	.00	0	.00
11/25/87	13502	0	.00	0	.00	0	.00	0	.00	0	.00	0	.00	0	.00	0	.00
11/30/87	13728	0	.00	0	.00	0	.00	0	.00	2	.05	0	.00	0	.00	0	.00
12/10/87	14115	0	.00	0	.00	0	.00	0	.00	5	.02	2	.00	0	.00	0	.00
12/17/87	14423	0	.00	0	.00	0	.00	0	.00	10	.07	0	.00	0	.00	0	.00
12/21/87	14605	0	.00	0	.00	0	.00	0	.00	6	.06	0	.00	0	.00	0	.00
12/29/87	14976	0	.00	0	.00	0	.00	0	.00	12	.09	0	.00	0	.00	0	.00
1/ 6/88	15350	0	.00	0	.00	0	.00	0	.00	1	.01	0	.00	0	.00	0	.00
1/12/88	15645	0	.00	0	.00	0	.00	0	.00	3	.05	5	.01	0	.00	0	.00
1/28/88	16004	0	.00	0	.00	0	.00	0	.00	1	.04	0	.00	0	.00	0	.00
2/10/88	16528	0	.00	0	.00	0	.00	0	.00	7	.04	13	.01	0	.00	0	.00
2/15/88	16817	2	.00	1	.00	0	.00	0	.00	8	.05	10	.01	0	.00	0	.00
2/24/88	17391	0	.00	0	.00	0	.00	0	.00	0	.01	0	.00	0	.00	0	.00
2/29/88	17661	0	.00	0	.00	0	.00	0	.00	8	.06	14	.02	0	.00	0	.00

* Not Recorded

TABLE D-8.

MAKE	PEUGEOT	MODEL	505
TRANSMISSION	M-5	MODEL YR	1982
VIN	VF3BA11F5CS322565	ENG DISP	2.0 L
PROJECT VEHICLE NO	08	ENG FAMILY	CPE2.0V6FAB3

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/18/87	74727	0	.00	0	.00	0	.00	0	.00	47	.45	104	.03	0	.01	0	.00
11/24/87	74960	1	.00	3	.00	0	.03	2	.07	32	.43	60	.01	3	.01	7	.00
11/30/87	75064	0	.00	1	.00	0	.00	0	.00	32	.38	72	.02	0	.03	1	.00
12/ 8/87	75161	0	.00	1	.00	0	.00	0	.00	33	.59	112	.07	3	.02	6	.00
12/14/87	75238	1	.00	1	.00	0	.00	0	.00	33	.29	67	.04	3	.01	4	.00
12/23/87	75525	1	.00	2	.00	0	.00	0	.00	27	.33	86	.02	2	.01	4	.00
12/31/87	75785	0	.00	0	.00	0	.01	0	.00	40	.38	68	.12	0	.01	0	.00
1/ 7/88	76000	0	.00	0	.00	0	.00	0	.00	30	.12	47	.01	0	.00	0	.00
1/11/88	76111	1	.00	1	.00	0	.00	0	.00	34	.13	130	.02	3	.01	4	.00
1/19/88	76206	1	.00	1	.00	0	.00	0	.00	33	.48	82	.02	3	.01	4	.00
1/28/88	76319	0	.00	0	.00	0	.00	0	.00	21	.54	102	.05	0	.01	0	.00
2/ 3/88	76416	0	.00	1	.00	0	.00	0	.00	28	.19	143	.02	1	.03	2	.00
2/10/88	76551	0	.00	0	.00	0	.00	0	.00	35	.23	83	.03	0	.00	2	.00
2/15/88	76696	1	.00	3	.00	0	.01	1	.00	23	.31	51	.06	0	.02	1	.01
2/23/88	76743	0	.00	0	.00	0	.02	0	.01	29	.52	41	.06	0	.00	0	.00

TABLE D-9.

MAKE	VOLKSWAGEN	MODEL	GOLF
TRANSMISSION	M-5	MODEL YR	1985
VIN	1VWFA0179FV032893	ENG DISP	1.8 L
PROJECT VEHICLE NO	09	ENG FAMILY	FVW1.8V6FAF6

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPK	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/19/87	26968	0	.00	2	.03	55	3.44	6	.04	5	.01	14	.13	0	.00	4	.07
11/23/87	27051	2	.14	56	1.60	12	.58	39	.86	11	.06	22	.08	1	.00	5	.06
12/ 1/87	27166	19	1.86	3	.03	63	3.90	6	.04	22	.12	22	.05	1	.00	3	.03
12/ 9/87	27418	51	2.87	11	.16	76	5.42	9	.09	12	.09	20	.09	1	.00	6	.11
12/17/87	27530	33	1.98	3	.07	3	.31	2	.05	15	.10	13	.04	0	.00	2	.12
12/21/87	27670	0	.00	3	.04	50	2.68	8	.06	17	.11	26	.10	2	.02	128	6.85
12/30/87	27879	1	.14	5	.09	57	3.91	3	.05	18	.13	27	.11	0	.02	78	3.07
1/ 5/88	28099	65	3.73	11	.06	77	5.10	11	.04	20	.10	22	.05	1	.00	5	.09
1/13/88	28346	19	1.21	4	.02	68	3.99	7	.02	28	.14	23	.03	21	1.02	101	3.93
1/18/88	28475	8	.57	64	1.87	67	3.81	24	.48	22	.17	22	.06	0	.01	102	4.32
1/26/88	28650	2	.41	6	.08	8	.66	1	.02	16	.21	16	.04	0	.01	81	3.34
2/ 2/88	28757	0	.01	1	.02	76	4.44	7	.02	22	.15	11	.04	14	1.18	130	6.04
2/ 9/88	28935	37	1.96	18	.15	62	3.29	12	.09	67	.20	28	.06	0	.00	3	.06
2/17/88	29128	22	1.08	16	.21	72	3.85	9	.05	23	.13	27	.05	12	.62	65	1.94
2/25/88	29427	13	.70	8	.08	59	2.65	7	.08	28	.17	32	.11	0	.02	28	.44

TABLE D-10.

MAKE	BMW	MODEL	318i
TRANSMISSION	M-5	MODEL YR	1985
VIN	WBAAC740XF0681496	ENG DISP	1.8 L
PROJECT VEHICLE NO	10	ENG FAMILY	FBM1.8V5FAB5

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/11/87	30335	13	.32	0	.00	26	.67	0	.00	154	1.25	205	.32	65	.78	8	.00
11/16/87	30556	53	.64	2	.00	50	.33	2	.00	156	1.21	220	.58	48	.50	6	.00
11/24/87	30764	73	.97	5	.00	81	1.24	5	.00	133	1.26	219	.34	81	1.03	12	.01
12/ 1/87	31011	73	1.12	2	.00	74	1.52	3	.01	164	1.65	189	.58	34	1.41	9	.01
12/10/87	31463	41	.35	1	.00	39	.37	1	.00	162	1.57	181	.68	53	.81	8	.00
12/14/87	31634	35	1.05	1	.00	70	1.34	4	.01	177	1.75	187	.69	86	1.12	11	.01
12/21/87	31847	40	1.08	2	.01	80	2.05	3	.01	176	1.70	178	.56	75	.83	9	.00
12/30/87	32194	116	1.78	61	.35	75	1.28	21	.25	163	1.92	203	.76	92	1.37	9	.01
1/ 7/88	32464	109	1.12	108	.64	90	1.21	112	.74	196	1.78	247	.37	135	1.44	159	.50
1/12/88	32717	87	1.01	8	.11	98	1.44	8	.11	195	1.13	261	.36	90	.81	8	.01
1/20/88	32974	24	.91	0	.00	72	1.22	0	.00	205	1.45	228	.27	72	.36	3	.00
1/27/88	33265	78	1.03	0	.02	100	1.49	1	.03	186	.98	239	.30	53	.35	0	.00
2/ 4/88	33527	22	.42	2	.00	115	1.30	4	.01	279	1.88	337	.31	114	.76	11	.00
2/ 9/88	33705	53	.50	0	.00	40	.72	0	.00	212	1.53	282	.36	98	.74	9	.00
2/15/88	33958	81	1.18	2	.00	96	1.36	3	.01	190	1.32	244	.30	111	1.14	10	.01

TABLE D-11.

MAKE	NISSAN	MODEL	PULSAR
TRANSMISSION	A-3	MODEL YR	1986
VIN	JN1MN24S0GM015782	ENG DISP	1.6 L
PROJECT VEHICLE NO	11	ENG FAMILY	GNS1.6V9HAFX

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/12/87	18341	5	.00	4	.00	2	.00	3	.00	10	.00	8	.00	4	.00	3	.00
11/16/87	18491	1	.00	0	.00	0	.00	0	.00	38	1.00	3	.01	1	.00	1	.00
11/25/87	18782	1	.01	1	.00	0	.01	0	.00	15	.31	0	.00	0	.00	1	.00
12/ 1/87	18955	4	.00	3	.00	2	.00	2	.00	10	.00	7	.01	6	.00	6	.00
12/11/87	19336	5	.02	4	.00	1	.00	0	.00	28	.40	8	.00	6	.00	5	.00
12/14/87	19435	7	.00	3	.00	3	.00	2	.00	8	.00	7	.00	4	.01	3	.00
12/21/87	19615	2	.00	3	.00	1	.00	1	.00	6	.01	6	.00	3	.00	4	.00
1/ 5/88	20060	0	.01	0	.00	0	.00	0	.00	238	6.79	205	2.09	0	.00	0	.00
1/13/88	20326	6	.07	5	.00	1	.00	1	.00	10	.00	9	.00	0	.02	0	.00
1/21/88	20564	2	.00	3	.00	1	.00	0	.00	7	.00	7	.00	4	.00	3	.00
1/27/88	20738	0	.01	0	.00	0	.00	0	.00	1	.03	0	.00	0	.06	0	.00
2/ 2/88	20895	0	.00	0	.00	0	.00	0	.00	12	.00	13	.00	2	.02	2	.00
2/12/88	21189	0	.00	0	.00	0	.00	0	.00	7	.00	10	.00	1	.00	0	.00
2/18/88	21392	0	.00	1	.00	0	.00	0	.00	7	.06	6	.00	0	.00	1	.00
2/22/88	21520	6	.00	5	.00	0	.01	0	.00	10	.03	23	.10	0	.01	0	.00

TABLE D-12.

MAKE CHEVROLET MODEL SUBURBAN
TRANSMISSION A-4 MODEL YR 1984
VIN 1G8EC16L6EF148544 ENG DISP 5.7 L
PROJECT VEHICLE NO 12 ENG FAMILY E1G5.7T4HHCX

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/12/87	61662	41	.00	15	.00	15	.00	6	.00	13	.00	11	.00	11	.00	6	.00
11/17/87	62084	16	.00	13	.00	9	.00	1	.00	47	.17	77	.14	7	.00	5	.00
11/25/87	62348	34	.00	20	.00	16	.00	8	.00	23	.08	57	.04	28	.00	10	.00
11/30/87	62461	20	.00	15	.00	10	.00	8	.00	163	.10	82	.15	12	.00	10	.00
12/ 8/87	62669	18	.00	21	.00	12	.00	7	.00	47	.09	65	.06	10	.00	8	.00
12/14/87	62836	15	.00	17	.00	8	.00	8	.00	31	.02	50	.04	7	.00	8	.00
12/23/87	62939	12	.00	16	.00	7	.00	3	.00	61	.06	73	.09	10	.00	3	.00
12/31/87	63316	16	.00	14	.00	9	.00	3	.00	27	.29	30	.03	10	.00	4	.00
1/ 6/88	63546	25	.00	11	.00	7	.00	1	.00	123	.13	66	.23	3	.00	3	.00
1/11/88	63702	53	.00	24	.00	11	.00	0	.00	102	.12	70	.14	11	.00	1	.00
1/19/88	63975	19	.00	17	.00	8	.00	1	.00	77	.17	110	.19	3	.00	7	.00
1/28/88	64424	30	.00	12	.00	6	.00	0	.00	68	.12	84	.10	23	.00	2	.00
2/ 1/88	64517	24	.13	16	.00	10	.00	6	.00	110	.13	118	.15	19	.00	6	.00
2/ 9/88	64682	17	.00	13	.00	9	.00	3	.00	118	.13	51	.02	7	.00	7	.00
2/17/88	64915	34	.00	14	.00	12	.00	7	.00	251	.23	192	.38	16	.00	8	.00

TABLE D-13.

MAKE	FORD	MODEL	RANGER
TRANSMISSION	A-4	MODEL YR	1985
VIN	1FTCR10A8FUA20564	ENG DISP	2.3 L
PROJECT VEHICLE NO	13	ENG FAMILY	FFM2.3T5FAG8

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/10/87	23801	31	.10	14	.00	11	.34	43	.23	175	.80	452	.36	33	.18	68	.32
11/24/87	23981	27	.12	247	1.49	15	.03	11	.01	166	.45	240	.18	38	.16	128	.79
12/ 3/87	24104	15	.11	136	.40	30	.22	79	.33	177	.59	236	.44	78	.18	167	.62
12/ 7/87	24179	58	.66	386	.62	13	.20	56	.43	194	1.30	233	.44	62	.28	55	.31
12/16/87	24332	15	.03	60	.17	31	.19	104	1.30	163	.53	251	.16	132	1.73	233	1.05
12/22/87	24461	53	.10	94	.43	57	.34	221	.77	131	.48	702	.74	64	.44	214	.82
12/28/87	24486	171	1.30	521	.86	117	1.19	437	.89	172	.61	252	.37	54	.13	248	1.57
1/ 5/88	24637	65	.49	140	.89	77	.81	97	.40	168	1.13	456	.62	156	2.52	201	.63
1/13/88	24657	21	.08	22	.13	95	.94	108	.54	161	.57	266	.22	89	1.02	201	1.28
1/20/88	24748	55	.42	141	.48	1	.07	102	.17	140	.55	218	.23	30	.18	133	1.65
1/25/88	24822	27	.12	52	.17	37	.22	174	.62	154	.64	317	.27	89	.63	173	.39
1/28/88	24951	47	.26	193	.51	24	.07	275	.82	144	.55	193	.17	103	1.18	132	.44

TABLE D-14.

MAKE	OLDSMOBILE	MODEL	CUTLASS SUPREME
TRANSMISSION	A-3	MODEL YR	1986
VIN	2G3GR69A0G2335325	ENG DISP	3.8 L
PROJECT VEHICLE NO	14	ENG FAMILY	G4G3.8V2NBY7

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/12/87	7036	7	.00	3	.00	4	.00	0	.00	1	.02	7	.00	4	.00	0	.00
11/17/87	7067	12	.00	2	.00	11	.00	3	.00	10	.00	6	.00	12	.00	4	.00
11/23/87	7107	8	.00	0	.00	3	.00	0	.00	6	.00	0	.00	1	.00	0	.00
12/ 2/87	7246	10	.00	1	.00	7	.00	0	.00	3	.00	1	.00	4	.00	0	.00
12/ 8/87	7309	11	.00	2	.00	8	.00	1	.00	29	.16	75	.43	10	.00	3	.00
12/16/87	7381	8	.00	0	.00	6	.00	0	.00	6	.00	0	.00	5	.00	0	.00
12/22/87	7489	10	.00	0	.00	5	.00	0	.00	41	.07	3	.00	1	.00	0	.00
12/28/87	7582	8	.00	1	.00	2	.00	0	.00	10	.00	0	.00	7	.00	0	.00
1/ 4/88	7644	11	.00	0	.00	2	.00	0	.00	7	.01	4	.00	6	.00	0	.00
1/13/88	7710	10	.00	0	.00	8	.00	0	.00	3	.00	0	.00	6	.00	0	.00
1/21/88	7791	6	.00	0	.00	4	.00	0	.00	5	.02	0	.00	3	.00	0	.00
1/28/88	7868	16	.00	3	.00	8	.00	8	.00	7	.00	3	.00	11	.00	1	.00
2/ 1/88	7929	12	.00	4	.00	6	.00	1	.00	10	.00	5	.00	8	.00	1	.00
2/10/88	7998	14	.00	4	.00	6	.00	0	.00	8	.00	4	.00	10	.00	1	.00
2/19/88	8110	13	.00	2	.00	8	.00	1	.00	15	.00	4	.00	12	.00	2	.00

TABLE D-15.

MAKE	HYUNDAI	MODEL	EXCEL GLS
TRANSMISSION	M-5	MODEL YR	1987
VIN	KMHLD31J3HU077266	ENG DISP	1.5 L
PROJECT VEHICLE NO	15	ENG FAMILY	HHY1.5V2HFB1

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/11/87	6297	3	.00	3	.00	3	.00	4	.00	16	.05	6	.00	10	.00	4	.00
11/17/87	6388	5	.00	0	.00	5	.00	1	.00	82	.06	43	.26	9	.00	5	.00
11/25/87	6779	6	.00	1	.00	5	.00	1	.00	17	.00	26	.46	6	.00	4	.00
12/ 3/87	7049	8	.00	4	.00	6	.00	2	.00	81	.01	13	.42	10	.00	6	.00
12/ 7/87	7120	11	.00	3	.00	5	.00	2	.00	85	.00	41	.26	6	.00	5	.00
12/16/87	7296	9	.00	0	.00	1	.00	0	.00	9	.02	5	.00	1	.00	0	.00
12/23/87	7868	0	.00	0	.00	0	.00	0	.00	15	.00	18	.05	0	.00	0	.00
12/29/87	8638	10	.00	3	.00	6	.00	3	.00	14	.00	17	.00	6	.00	6	.00
1/ 4/88	8946	6	.00	2	.00	5	.00	1	.00	16	.00	17	.03	8	.00	6	.00
1/14/88	8955	0	.00	0	.00	0	.00	0	.00	18	.30	7	.01	4	.00	0	.00
1/19/88	9080	8	.00	1	.00	6	.00	1	.00	41	.00	20	.02	9	.00	6	.00
1/25/88	9289	11	.00	4	.00	6	.00	2	.00	6	.00	13	.00	7	.00	3	.00
2/ 9/88	9771	9	.00	1	.00	4	.00	0	.00	0	.00	1	.00	7	.00	8	.00
2/15/88	9963	28	.01	4	.00	8	.00	2	.00	10	.00	10	.01	5	.00	3	.00
2/25/88	10279	8	.00	0	.00	6	.00	0	.00	16	.00	13	.02	9	.00	2	.00

TABLE D-16.

MAKE FORD MODEL THUNDERBIRD
TRANSMISSION A-3 MODEL YR 1986
VIN [illegible] ENG DISP 2.3 L
PROJECT VEHICLE NO 16 ENG FAMILY [illegible]

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/12/87	[illegible]	[illegible]	1.14	1	[illegible]	[illegible]	1.07	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.24	[illegible]	[illegible]
11/18/87	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11/24/87	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11/30/87	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12/ 7/87	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12/17/87	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1/ 6/88	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]
1/12/88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.71	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE D-17.

MAKE	FORD	MODEL	E-150
TRANSMISSION	A-4	MODEL YR	1986
VIN	1FDEE14N5GHB46209	ENG DISP	5.0 L
PROJECT VEHICLE NO	17	ENG FAMILY	GFM5.0T5F7F7

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/13/87	13631	23	.05	41	.12	0	.00	1	.01	58	.27	279	3.95	2	.01	105	.63
11/18/87	13876	3	.00	9	.07	0	.00	12	.08	90	.74	292	2.64	1	.01	34	.02
11/23/87	13940	11	.11	18	.05	1	.01	45	.13	47	.12	38	.01	3	.01	24	.06
11/30/87	14227	3	.00	6	.05	2	.06	19	.13	109	.86	246	1.67	21	.31	27	.08
12/ 8/87	14299	3	.00	7	.02	1	.00	7	.02	92	.76	180	.44	2	.00	13	.06
12/17/87	14852	4	.00	17	.07	0	.00	8	.03	77	.43	172	.39	6	.06	22	.08
12/23/87	15136	8	.00	24	.08	0	.00	7	.07	41	.07	47	.05	2	.01	29	.16
12/30/87	15538	4	.00	13	.06	1	.09	28	.18	46	.44	289	3.52	5	.04	42	.03
1/ 5/88	15844	2	.01	25	.32	3	.01	8	.01	105	1.49	278	3.67	1	.03	29	.18
1/11/88	15979	5	.02	36	.15	0	.01	11	.08	58	.31	214	1.85	1	.08	13	.10
1/20/88	16077	3	.00	15	.08	0	.00	9	.08	46	.21	264	3.64	1	.04	98	.41
1/26/88	16288	59	.44	51	.18	0	.00	7	.05	3	.00	16	.04	1	.05	6	.07
2/ 5/88	16555	8	.00	11	.07	0	.00	5	.06	55	1.32	333	5.16	0	.08	15	.10
2/11/88	16747	6	.00	21	.08	1	.00	6	.05	148	2.45	228	3.53	28	1.13	96	.11
2/18/88	16987	6	.00	13	.05	1	.00	16	.03	97	.27	250	2.86	3	.01	45	.10

TABLE D-16.

MAKE	CHEVROLET	MODEL	CAPRICE CLASSIC
TRANSMISSION	A-4	MODEL YR	1984
VIN	[illegible]	ENG DISP	5.0 L
PROJECT VEHICLE NO	10	ENG FAMILY	[illegible]

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE D-19.

MAKE CHEVROLET MODEL CAVALIER
TRANSMISSION [illegible] MODEL YR [illegible]
VIN [illegible] ENG DISP 2.0 L
PROJECT VEHICLE NO [illegible] ENG FAMILY [illegible]

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER MILES	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE D-20.

MAKE	BUICK	MODEL	LESABRE
TRANSMISSION	A-4	MODEL YR	1987
VIN	[illegible]	ENG DISP	3.8 L
PROJECT VEHICLE NO	20	ENG FAMILY	H2G3.8V8XEB7

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/13/87	6049	0	.00	0	.00	0	.00	0	.00	6	.00	7	.00	0	.00	0	.00
11/16/87	6133	0	.00	0	.00	0	.00	0	.00	2	.01	3	.00	0	.00	0	.00
12/ 1/87	6242	0	.00	0	.00	0	.00	0	.00	12	.05	6	.00	0	.00	0	.00
12/ 9/87	6577	0	.00	0	.00	0	.00	0	.00	3	.00	3	.00	0	.00	0	.00
12/15/87	7098	0	.00	0	.00	0	.00	0	.00	4	.01	2	.00	0	.00	0	.00
12/23/87	7384	0	.00	0	.00	0	.00	0	.00	1	.00	1	.00	0	.00	0	.00
12/31/87	7886	0	.00	0	.00	0	.00	0	.00	1	.01	2	.00	0	.00	0	.00
1/ 6/88	7980	0	.00	0	.00	0	.00	0	.00	1	.01	2	.01	0	.00	0	.00
1/14/88	10402	0	.00	0	.00	0	.00	0	.00	2	.01	0	.00	0	.00	0	.00
1/18/88	10528	0	.00	0	.00	0	.00	0	.00	0	.00	1	.00	0	.00	0	.00
1/27/88	10935	4	.01	2	.01	0	.00	0	.00	6	.01	6	.00	0	.00	0	.00
2/ 5/88	11346	0	.00	0	.00	0	.00	0	.00	12	.01	6	.00	0	.00	0	.00
2/11/88	11633	1	.00	0	.00	0	.00	0	.00	7	.00	5	.01	0	.00	0	.00
2/17/88	11820	0	.00	0	.00	0	.00	0	.00	4	.00	4	.00	0	.00	0	.00
2/25/88	12051	0	.00	0	.00	0	.00	0	.00	5	.03	6	.00	0	.00	0	.00

TABLE D-21.

MAKE	VOLKSWAGEN	MODEL	SCIROCCO
TRANSMISSION	M-5	MODEL YR	1982
VIN	WVWCA0532CK023127	ENG DISP	1.7 L
PROJECT VEHICLE NO	21	ENG FAMILY	CVW1.7V6F5FX

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/24/87	59400	0	.00	0	.01	0	.00	24	.29	29	.16	18	.01	6	.22	8	.04
12/ 2/87	59636	3	.06	3	.01	1	.00	3	.01	31	.09	20	.11	7	.00	12	.03
12/29/87	60000	2	.00	3	.01	1	.00	35	.54	28	.26	22	.01	4	.10	29	.13
1/ 7/88	60462	2	.00	7	.02	1	.00	50	.47	20	.03	20	.00	4	.00	8	.01
1/14/88	60601	4	.00	7	.01	1	.00	50	.53	27	.02	18	.10	5	.00	24	.12
1/19/88	60995	0	.01	2	.00	0	.00	1	.01	49	.66	33	.09	0	.00	3	.01
1/25/88	61278	1	.00	6	.00	0	.00	2	.00	24	.22	21	.01	3	.00	6	.01
2/ 5/88	61673	12	.18	7	.00	1	.00	2	.00	23	.06	19	.00	2	.00	5	.01
2/ 8/88	61918	0	.00	3	.00	0	.00	3	.00	36	.21	27	.01	2	.00	8	.01
2/12/88	62062	0	.00	2	.00	0	.02	5	.01	51	.17	26	.00	2	.00	8	.01
2/15/88	62257	3	.00	4	.00	0	.00	2	.00	64	.40	24	.02	2	.00	7	.01
2/19/88	62331	1	.00	3	.00	0	.00	4	.01	46	.30	24	.03	5	.00	10	.01
2/23/88	62519	0	.00	0	.00	0	.00	0	.01	25	.11	24	.02	0	.00	3	.02
2/26/88	62571	0	.00	1	.00	0	.00	0	.02	24	.47	21	.03	0	.00	3	.02
2/29/88	62768	0	.00	0	.01	0	.00	0	.02	29	.21	19	.02	0	.00	5	.02

TABLE D-22.

MAKE	CHEVROLET	MODEL	ASTRO
TRANSMISSION	A-4	MODEL YR	1987
VIN	1GNDM15Z7HB236316	ENG DISP	4.3 L
PROJECT VEHICLE ID	22	ENG FAMILY	HGM4.3T5TMDB

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/10/87	6779	2	.42	57	.32	0	.10	72	.22	71	.23	213	1.44	3	.41	53	.47
11/19/87	7210	1	.70	22	.15	2	.00	49	.12	95	.20	228	.24	5	.12	92	.17
11/24/87	7427	0	.00	6	.09	0	.40	24	.02	80	.27	284	.22	0	.00	2	.02
12/ 1/87	7703	1	.40	72	.22	0	.13	42	.54	114	.30	217	1.21	1	.30	80	.06
12/10/87	7992	2	.30	26	.02	5	.00	32	.11	91	.30	221	1.26	24	.04	24	.20
12/14/87	8204	2	.00	56	.02	3	.00	60	.07	100	.60	232	1.11	2	.02	136	.17
12/22/87	8713	0	.01	24	.04	0	.00	56	.06	60	.28	244	1.08	7	.00	49	.30
1/ 6/88	9125	0	.00	7	.29	0	.00	3	.16	70	.63	403	.74	0	.00	87	.16
1/12/88	9241	3	.00	62	.17	6	.00	95	.28	80	.20	258	1.03	6	.30	51	.31
1/18/88	9605	2	.00	48	.12	6	.00	30	.21	81	.45	225	1.48	3	.01	32	.40
1/25/88	9943	0	.00	40	.18	0	.00	116	.32	54	.13	124	.11	0	.00	28	.28
2/ 4/88	10222	4	.30	103	.11	6	.00	76	.21	95	.42	240	1.02	2	.00	70	.00
2/12/88	10622	0	.30	72	.73	2	.30	79	.15	64	.14	196	1.24	1	.00	63	.40
2/17/88	11030	2	.00	106	.28	2	.00	50	.13	87	.31	222	1.20	6	.01	59	.52
2/24/88	11152	1	.30	19	.22	1	.00	47	.11	82	.24	221	.31	0	.00	40	.45

TABLE D-23.

MAKE	NISSAN	MODEL	PULSAR
TRANSMISSION	M-5	MODEL YR	1987
VIN	[illegible]	ENG DISP	1.6 L
PROJECT VEHICLE NO	23	ENG FAMILY	[illegible]

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/11/87	2207	0	.00	0	.00	1	.00	0	.00	102	.41	221	.69	2	.00	7	.00
11/19/87	2076	0	.02	0	.00	0	.00	0	.00	96	.35	225	.36	4	.00	12	.00
11/24/87	2482	0	.00	0	.00	0	.00	0	.00	85	.36	149	.21	1	.00	3	.00
11/30/87	2991	0	.10	0	.00	0	.00	0	.00	76	.38	207	1.22	7	.00	6	.10
12/11/87	4978	4	.00	107	1.14	0	.00	6	.00	79	.36	228	.56	2	.00	13	.00
12/15/87	5309	1	.00	2	.00	1	.00	6	.00	68	.33	174	.28	7	.10	17	.00
12/21/87	5835	0	.00	1	.00	0	.00	1	.00	86	.33	200	.89	9	.00	8	.00
12/28/87	6448	0	.00	0	.00	0	.00	0	.00	75	.37	133	.13	0	.10	7	.00
1/ 6/88	6851	0	.00	1	.00	0	.00	0	.00	93	.33	151	.02	0	.00	6	.00
1/14/88	7472	0	.00	0	.00	0	.00	1	.00	77	.32	93	.12	4	.00	6	.00
1/19/88	7796	1	.01	46	.30	0	.00	0	.00	68	.32	288	1.32	1	.00	8	.00
1/27/88	8300	1	.00	0	.00	0	.00	0	.00	68	.36	225	.45	0	.00	3	.00
2/ 2/88	8865	0	.00	0	.00	0	.00	0	.00	60	.33	208	.45	0	.00	6	.00
2/10/88	9466	0	.00	98	.28	1	.00	0	.00	97	.31	168	.40	3	.00	11	.00
2/15/88	9970	0	.00	2	.00	1	.00	5	.00	76	.31	208	1.04	3	.00	12	.00

TABLE D-24.

MAKE BUICK MODEL CENTURY
TRANSMISSION A-4 MODEL YR 1986
VIN [illegible] ENG DISP 2.8 L
PROJECT VEHICLE NO 24 ENG FAMILY [illegible]

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER (MILES)	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT	HC PPM	CO PCT
11/17/87	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11/23/87	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12/ 2/87	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12/11/87	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12/16/87	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12/22/87	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12/30/87	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1/ 7/88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1/14/88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1/20/88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1/26/88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2/ 4/88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2/12/88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2/16/88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2/22/88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE B-23.

MAKE	VOLVO	MODEL	[illegible]
TRANSMISSION	[illegible]	MODEL YR	[illegible]
VIN	[illegible]	ENG DISP	[illegible]
PROJECT VEHICLE NO	[illegible]	ENG FAMILY	[illegible]

		MORNING TESTS								AFTERNOON TESTS							
		BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING				BEFORE 2500 RPM CONDITIONING				AFTER 2500 RPM CONDITIONING			
		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE		2500 RPM MODE		IDLE MODE	
TEST DATE	ODOMETER MILES	HC PPM	CO %	HC PPM	CO %	HC PPM	CO %	HC PPM	CO %	HC PPM	CO %	HC PPM	CO %	HC PPM	CO %	HC PPM	CO %
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]

[illegible]

Figure B-	Vehicle No.	Vehicle Make and Model
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[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]
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Legend for Plots

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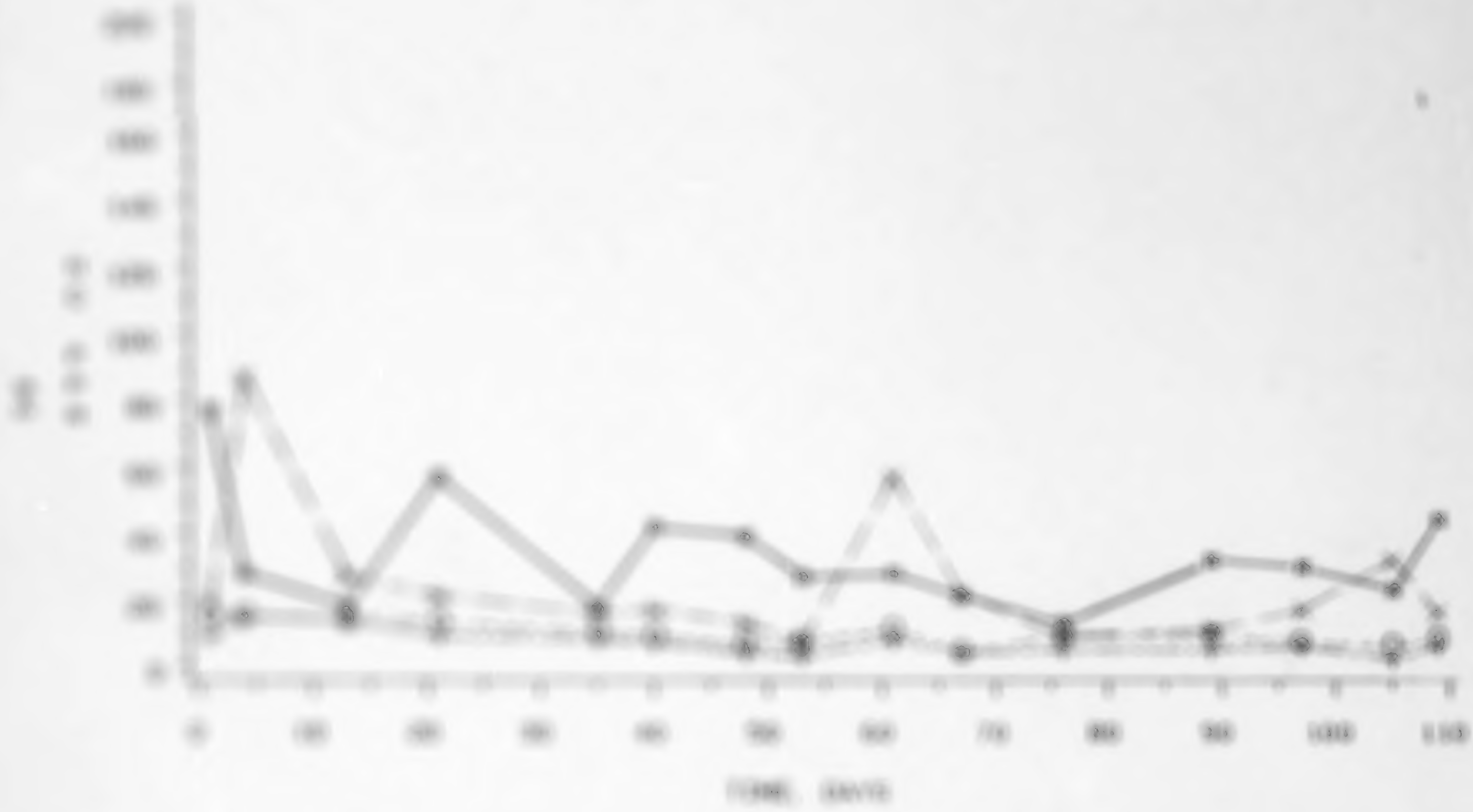
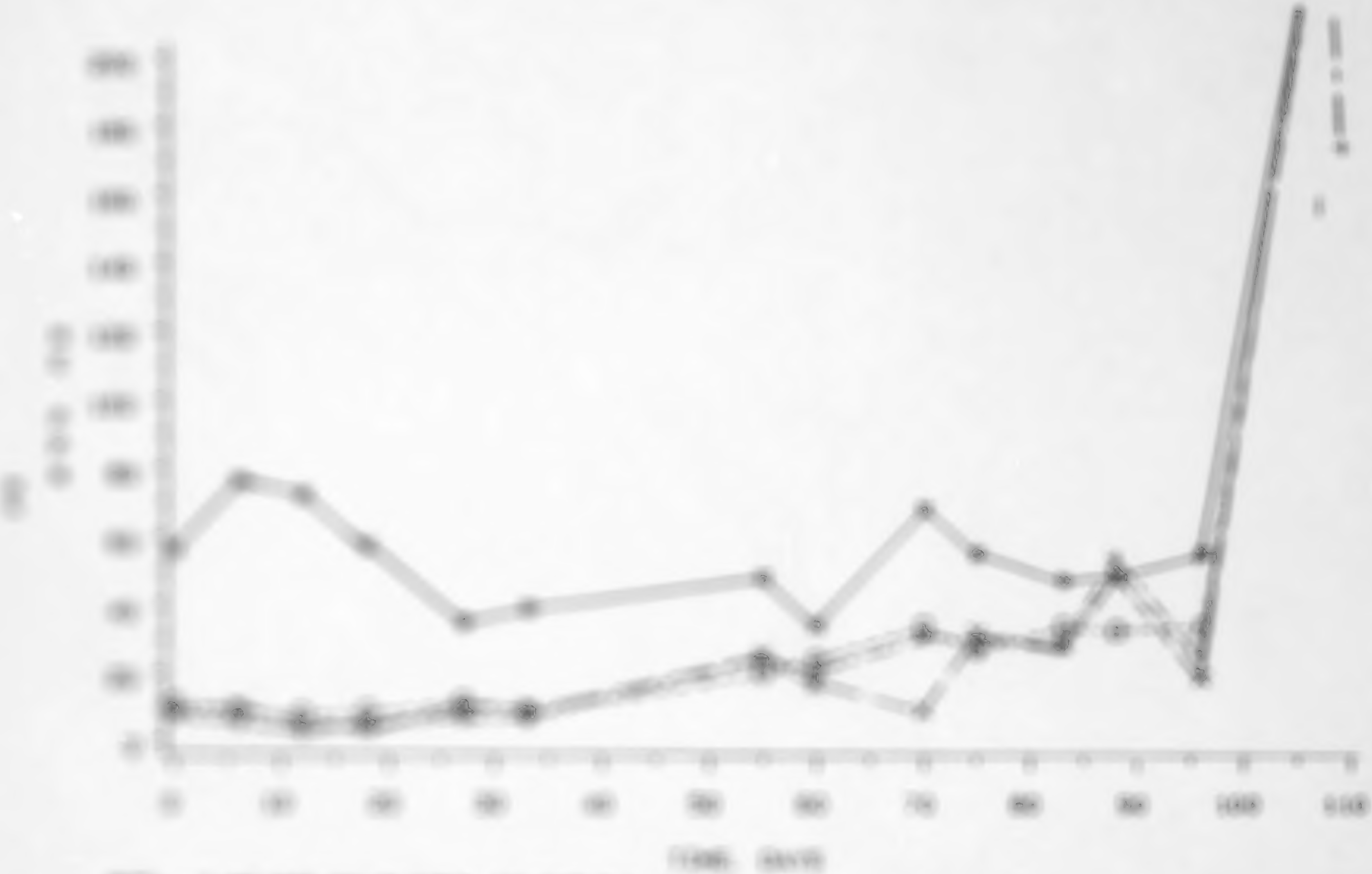

0
100
200
300
400
500
600
700
800
900
1000
1100
TIME, DAYS

[illegible]


0
10
20
30
40
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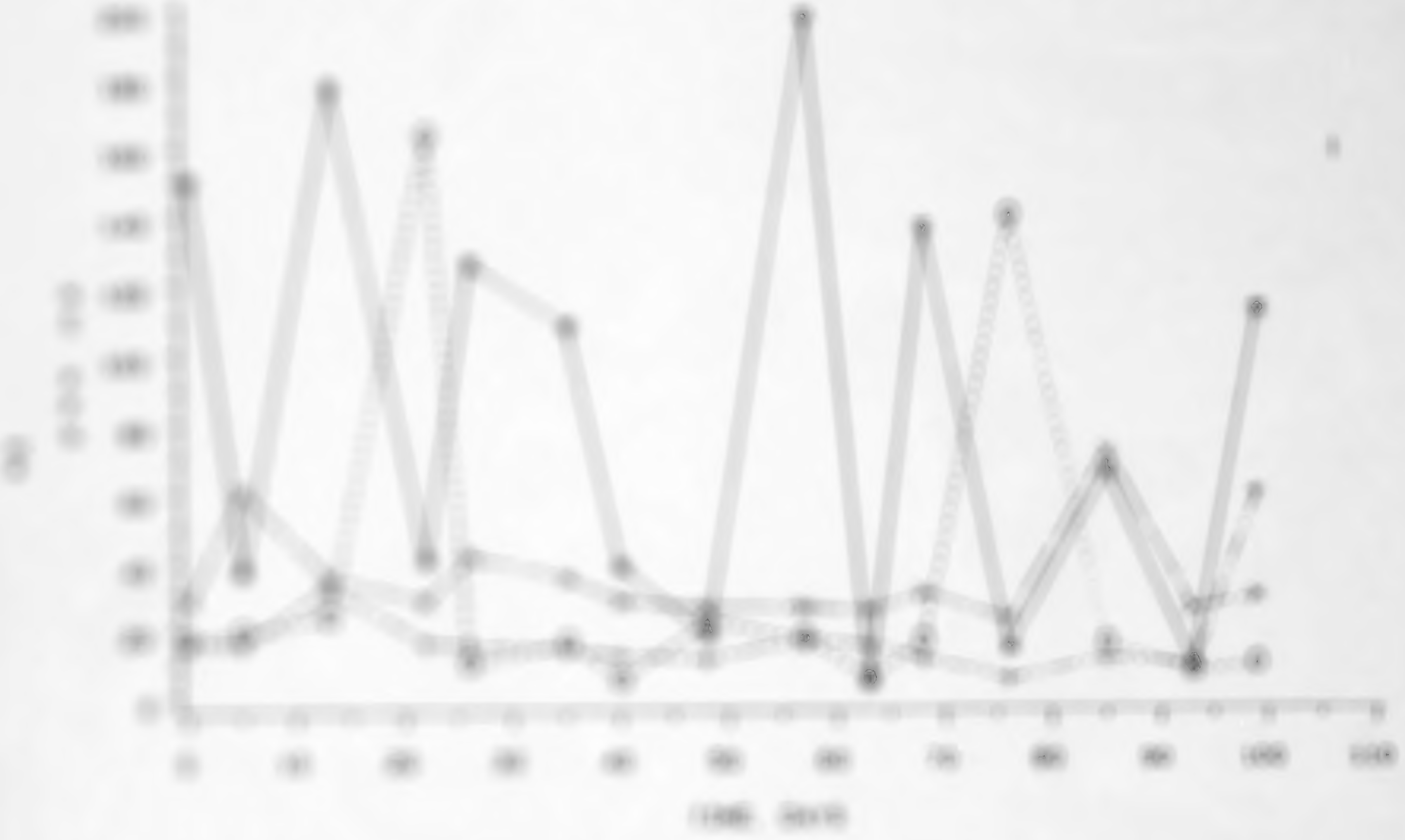
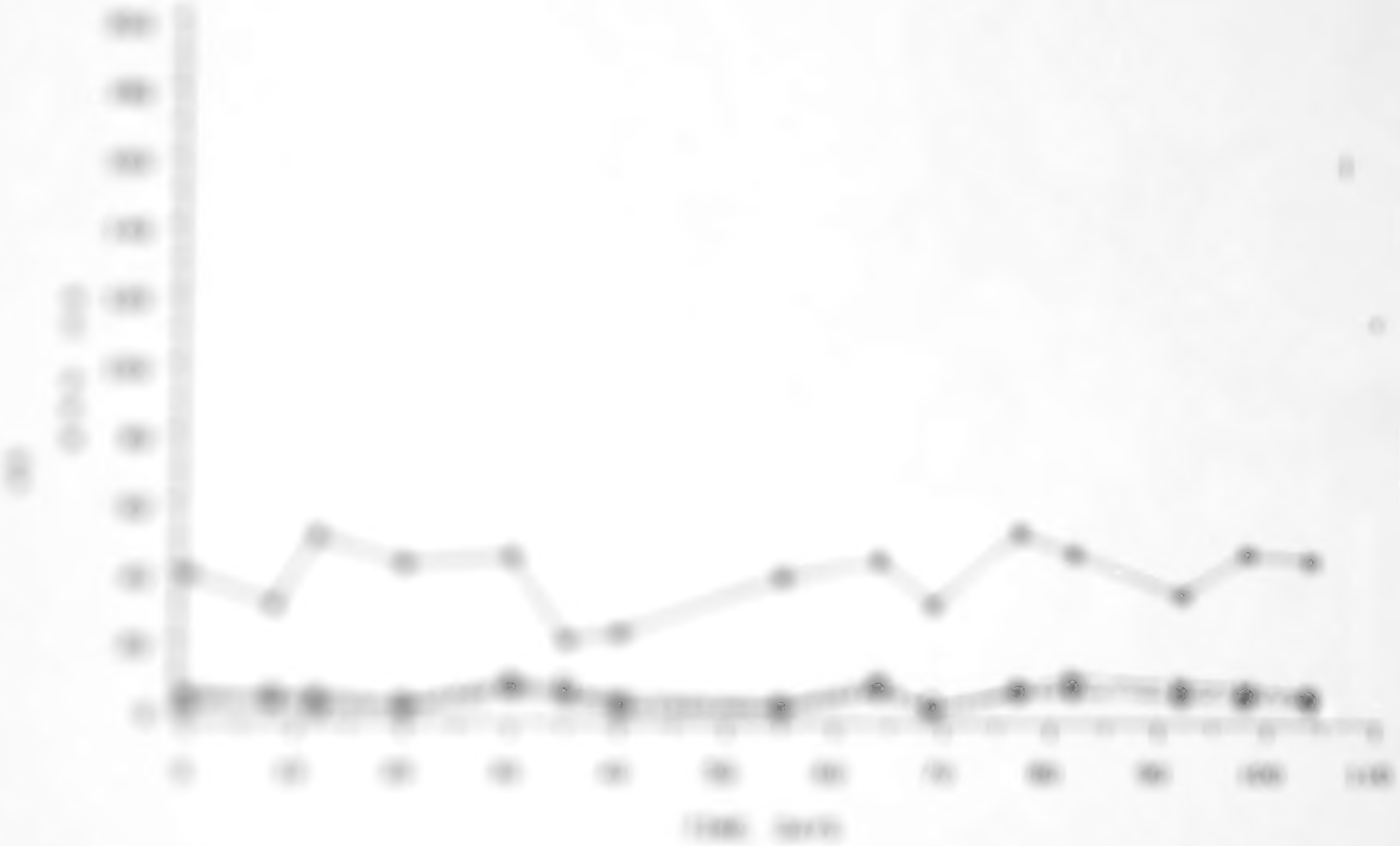
60
70
80
90
100
110
TIME, DAYS

[illegible]

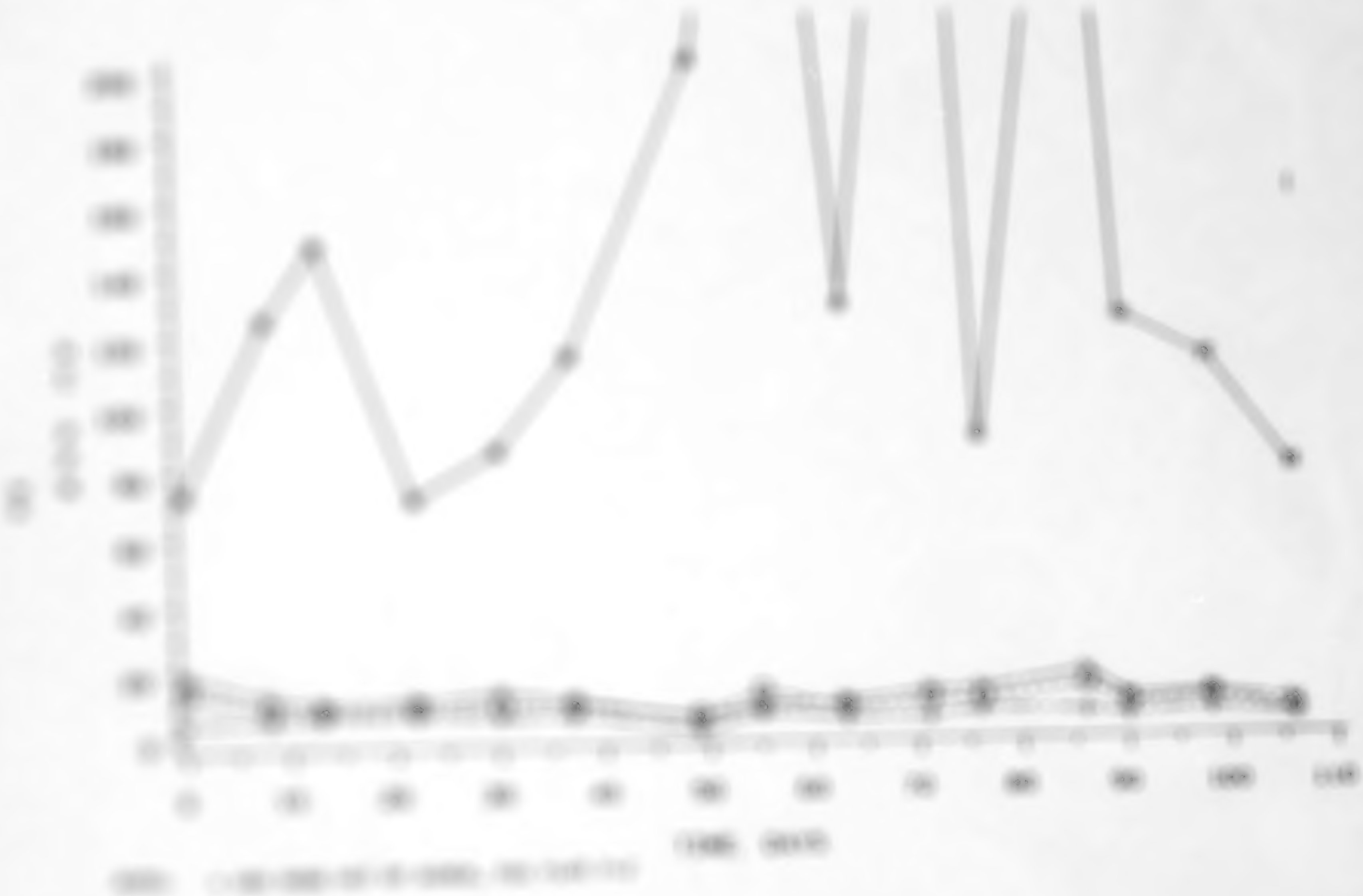
[illegible]


0
10
20
30
40
50
60
70
80
90
100
110

[illegible]



[illegible]



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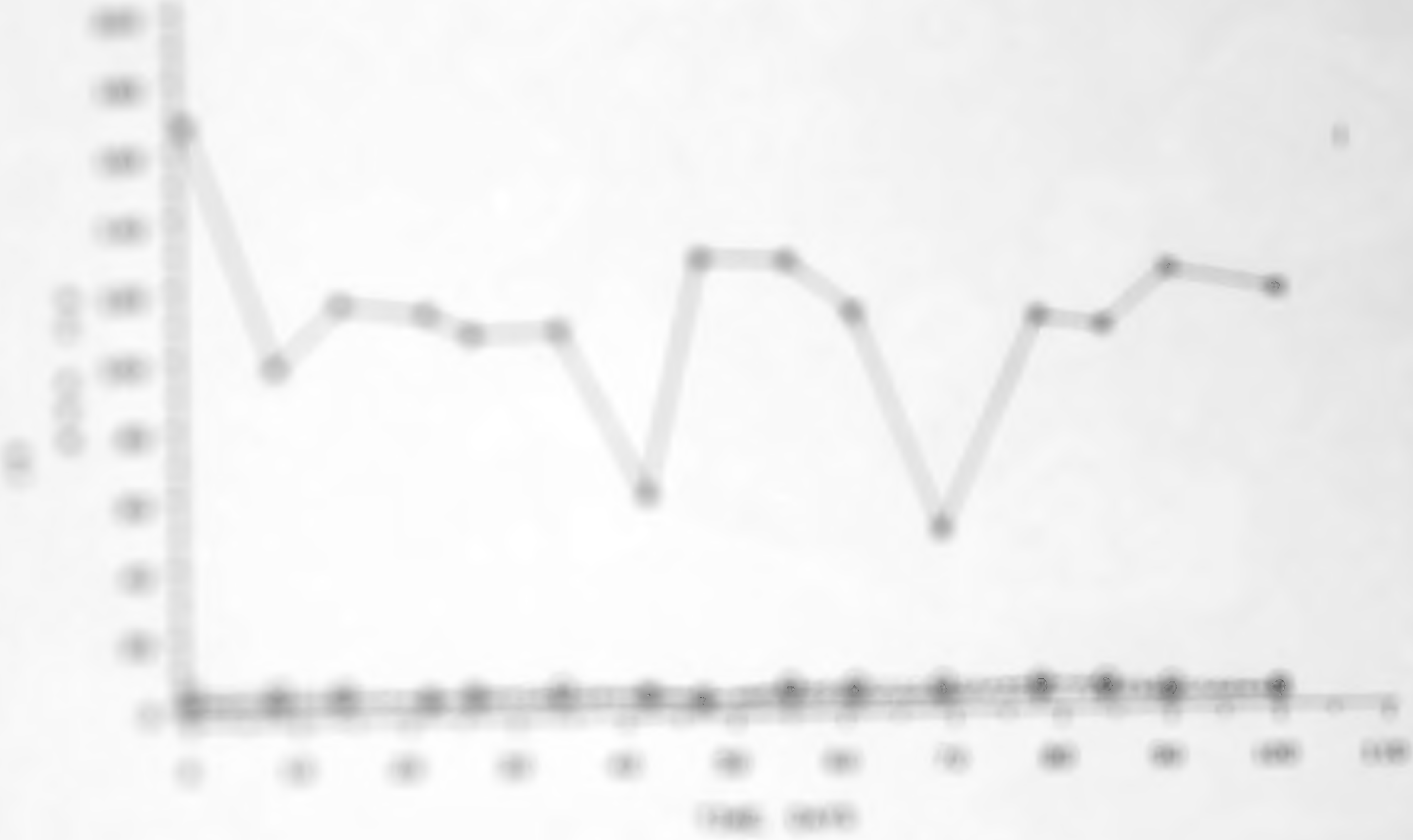
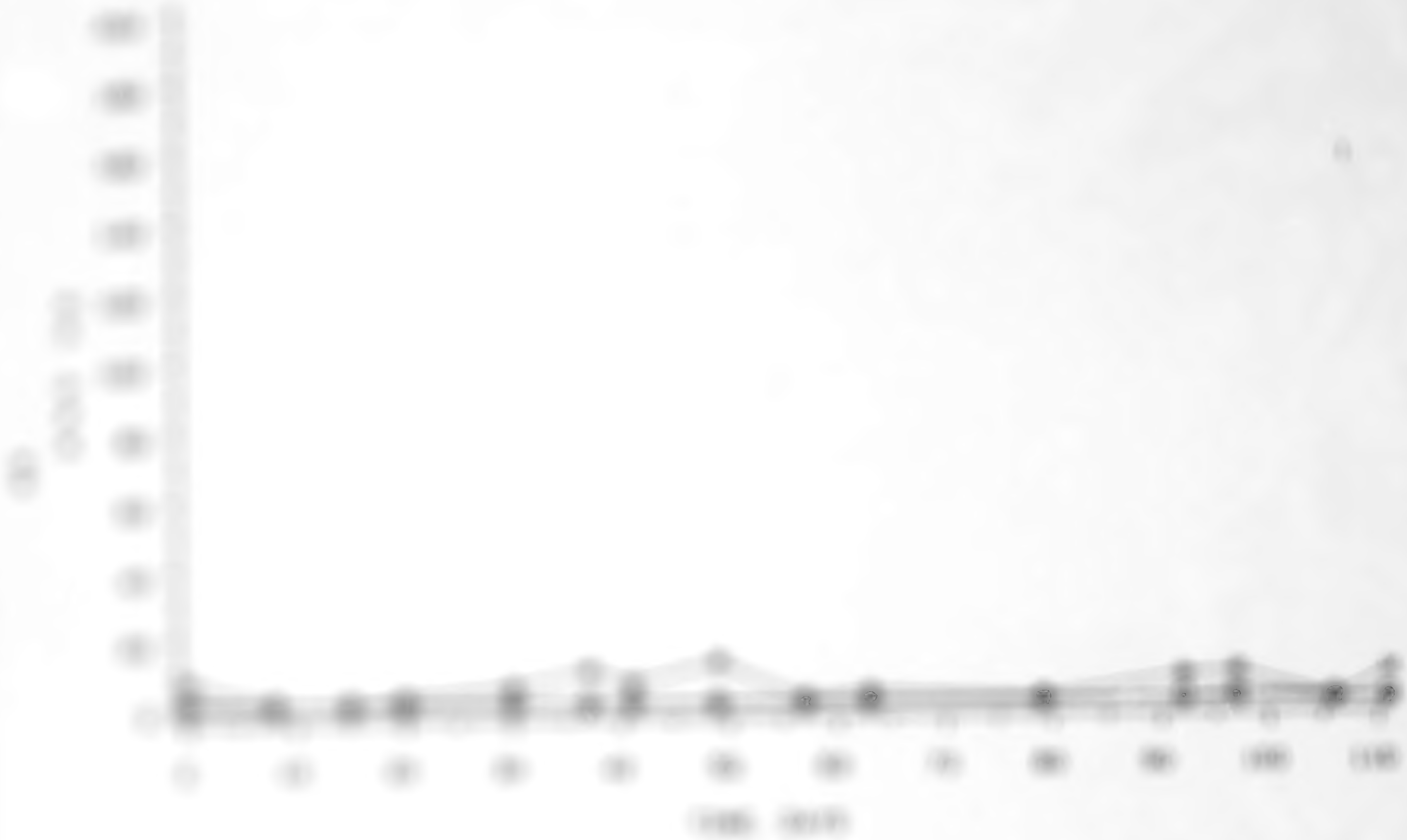


[illegible]



[illegible]

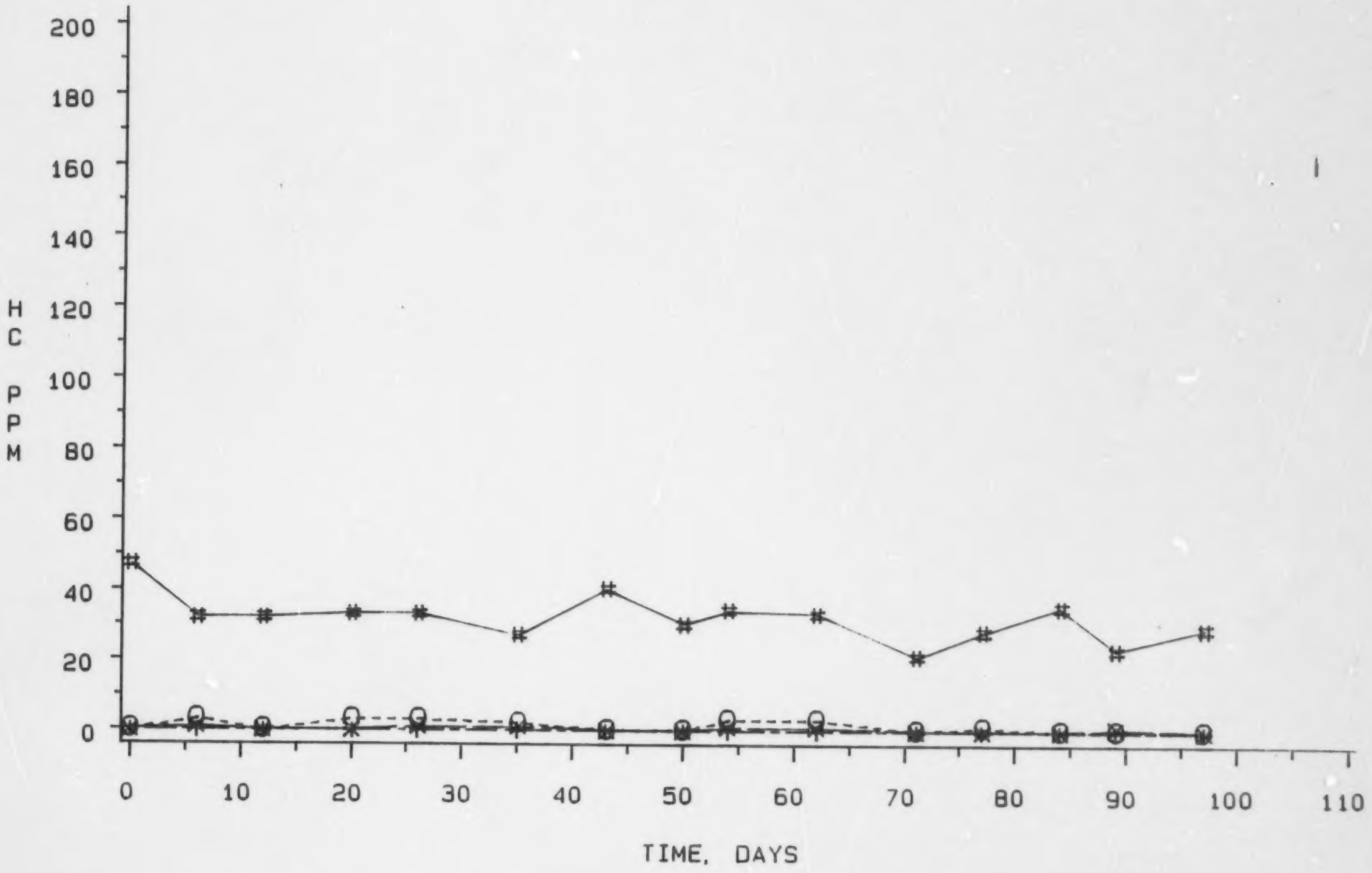


FIGURE E-8. VEHICLE 8 - 1982 PEUGEOT 505, HC-2500 RPM VS TIME

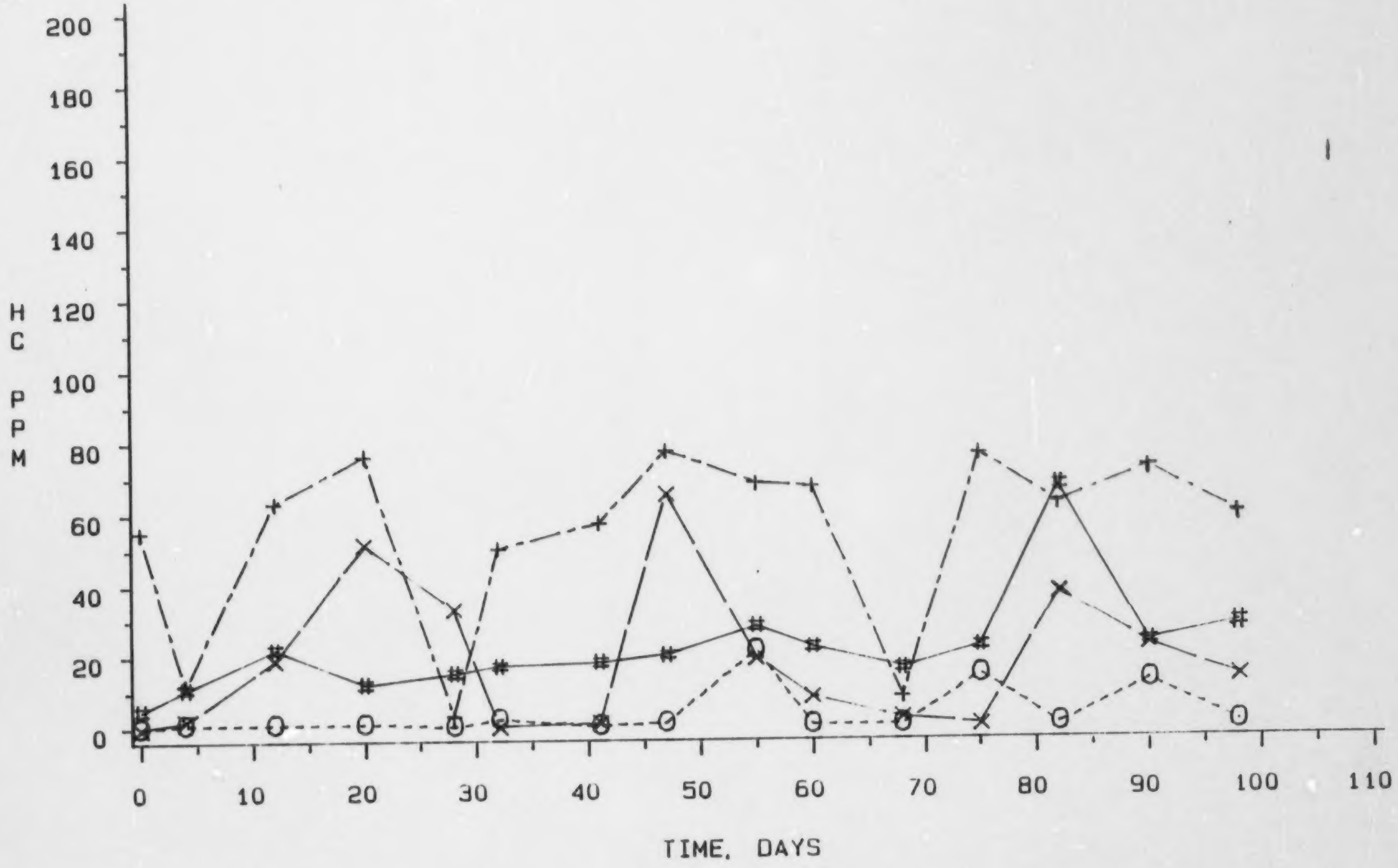


FIGURE E-9. VEHICLE 9 - 1985 VOLKSWAGEN GOLF, HC-2500 RPM VS TIME

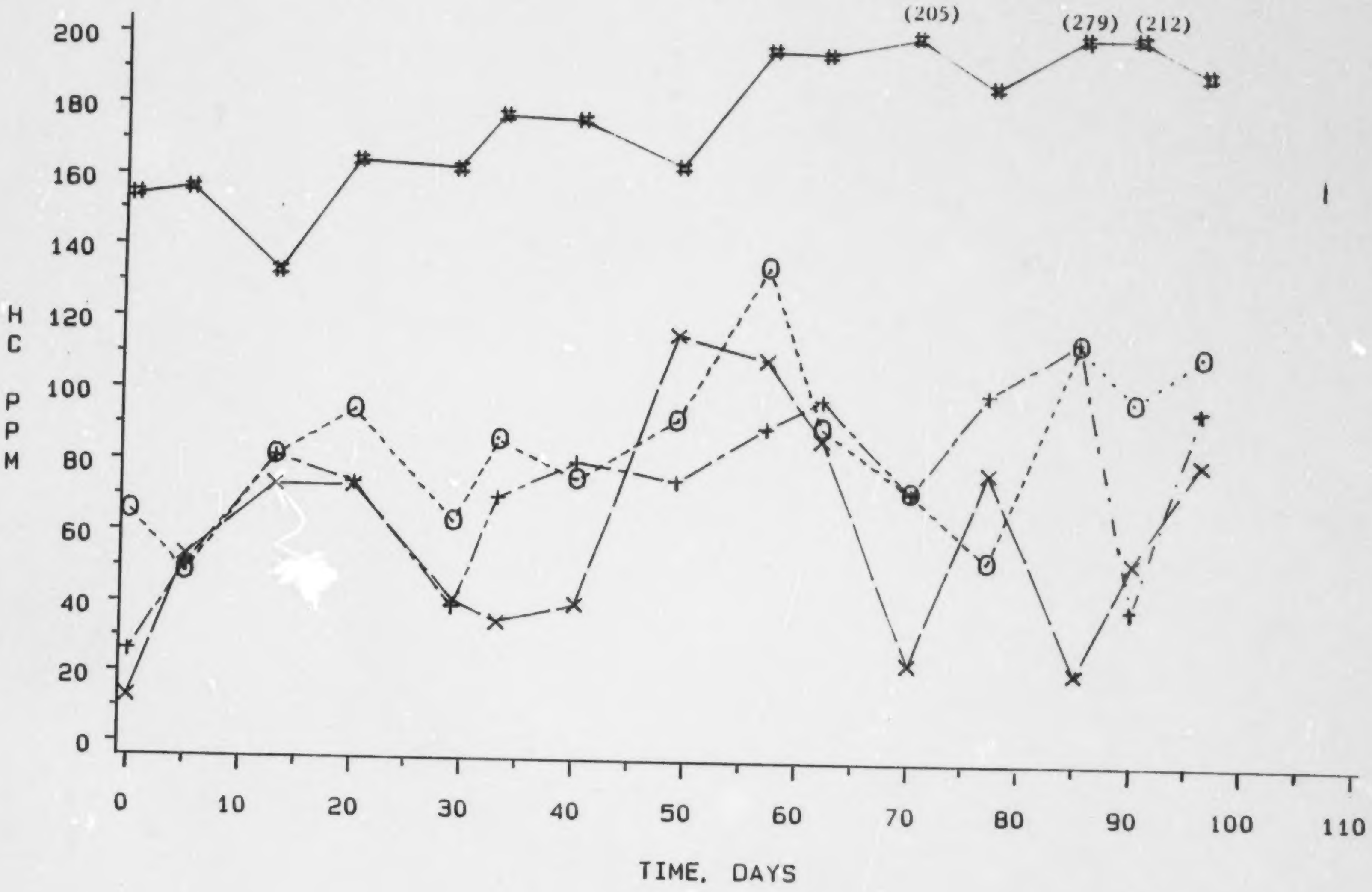


FIGURE E-10. VEHICLE 10 - 1985 BMW 318i, HC-2500 RPM VS TIME

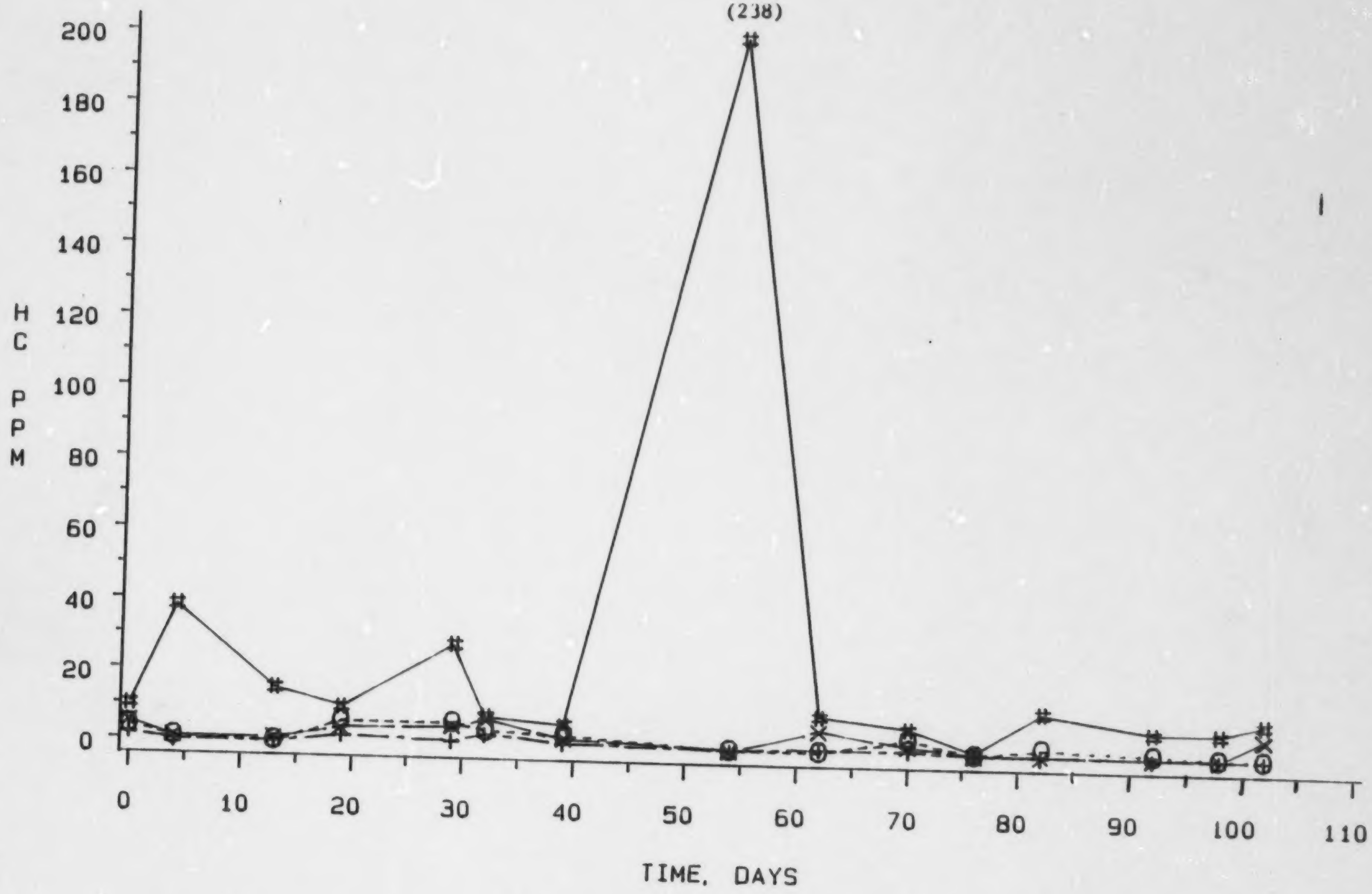


FIGURE E-11. VEHICLE 11 - 1986 NISSAN PULSAR, HC-2500 RPM VS TIME

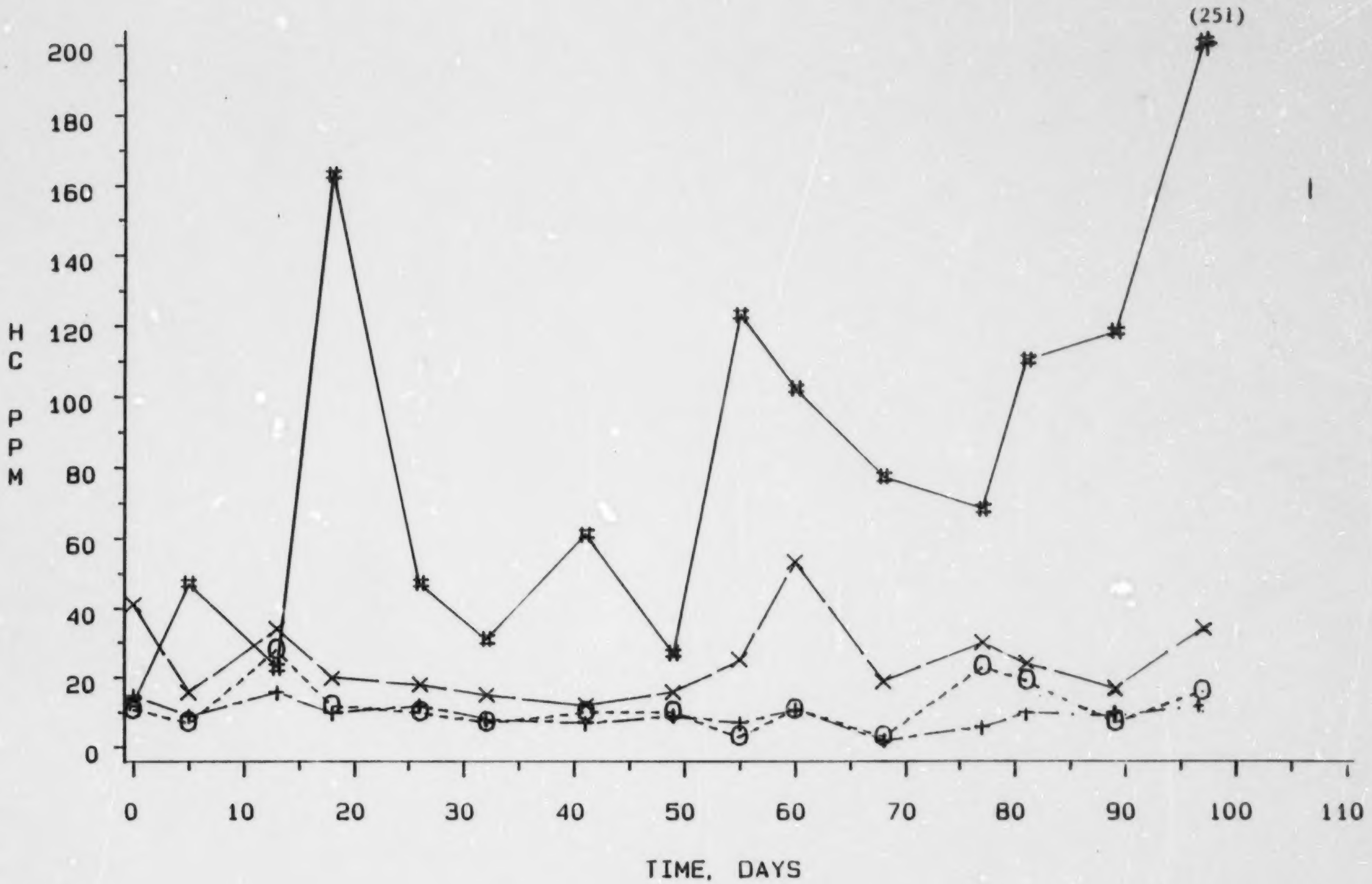


FIGURE E-12. VEHICLE 12 - 1984 CHEVROLET SUBURBAN, HC-2500 RPM VS TIME

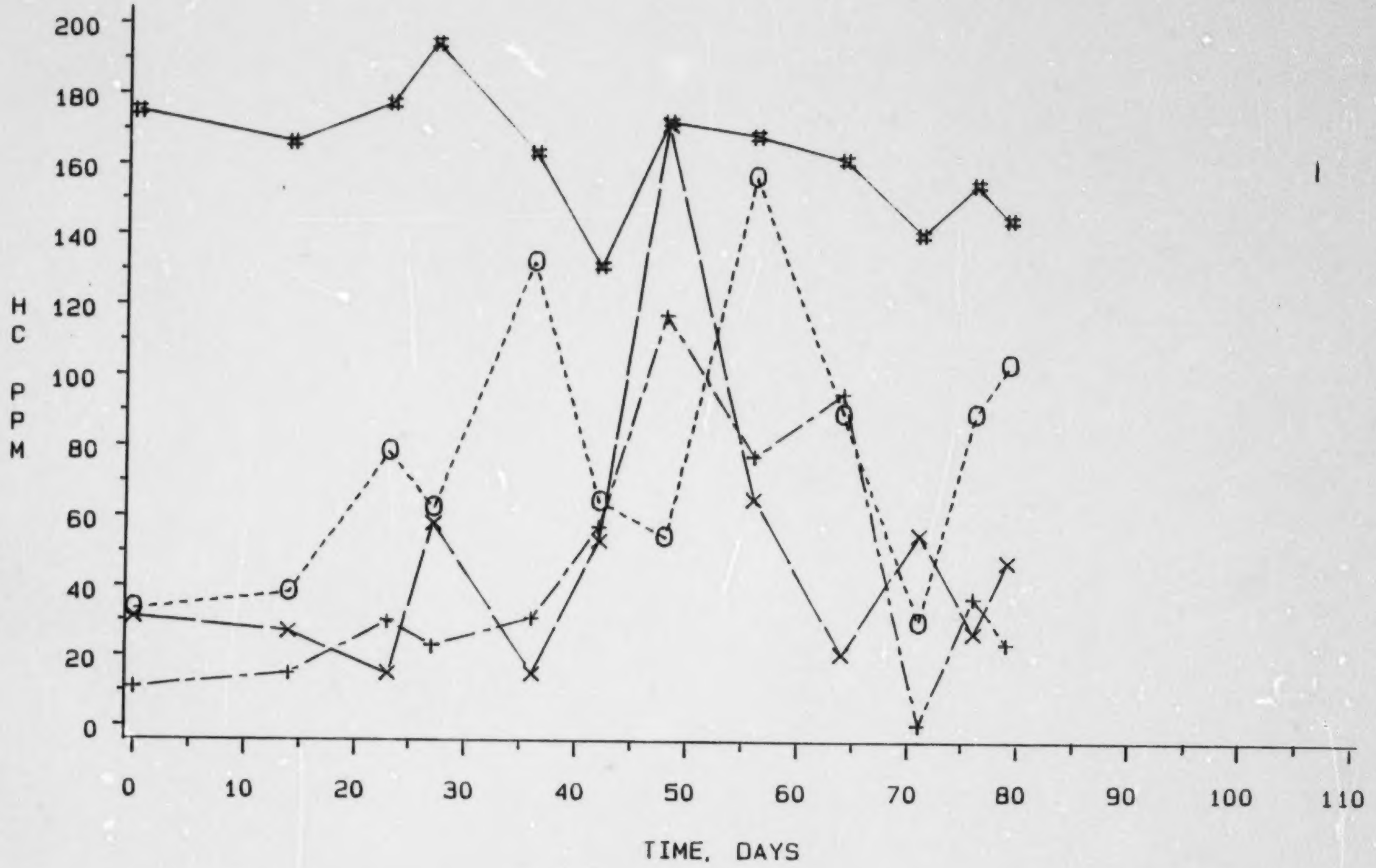


FIGURE E-13. VEHICLE 13 – 1985 FORD RANGER, HC-2500 RPM VS TIME

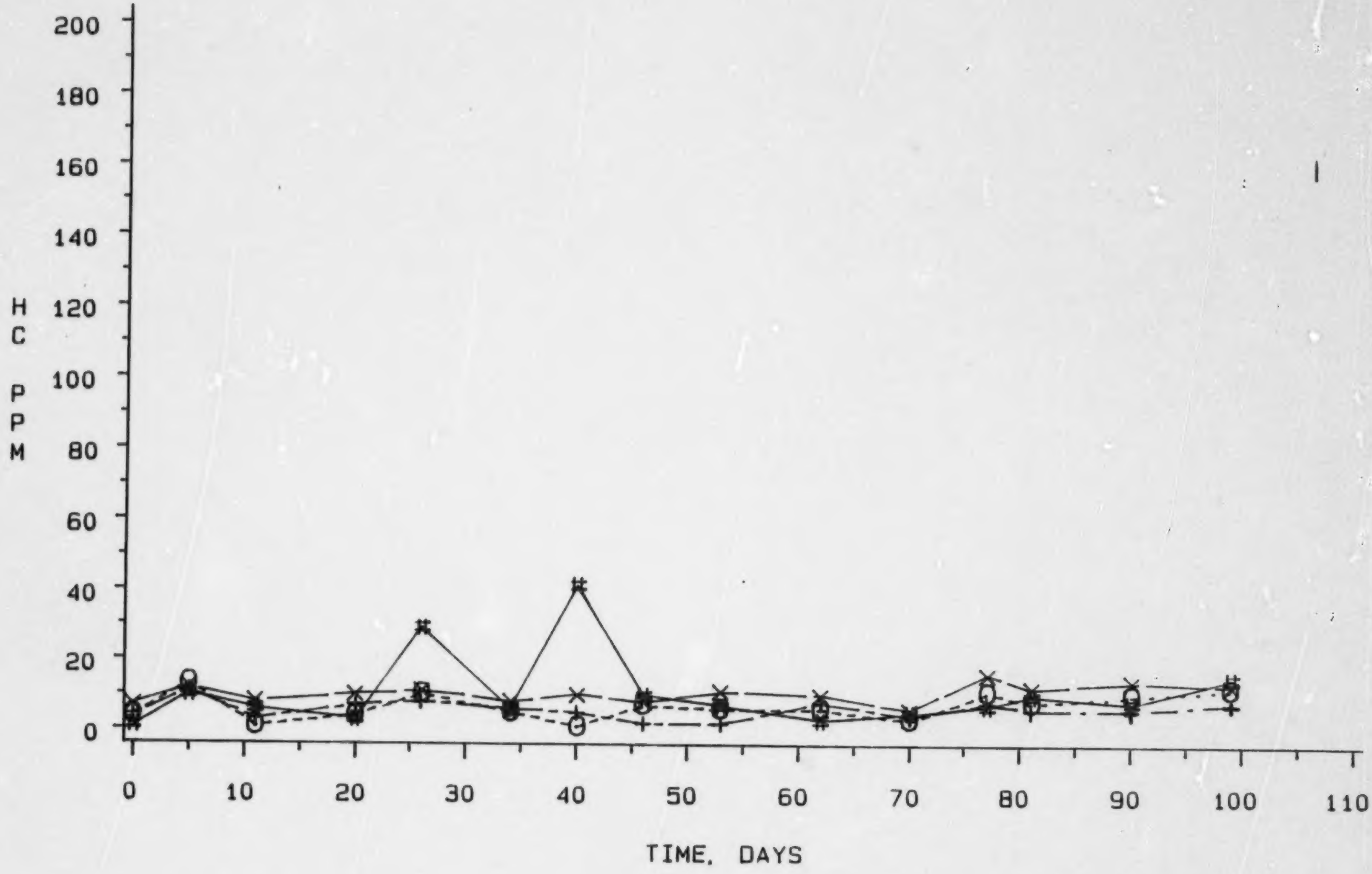


FIGURE E-14. VEHICLE 14 - 1986 OLDSMOBILE CUTLASS SUPREME, HC-2500 RPM VS TIME

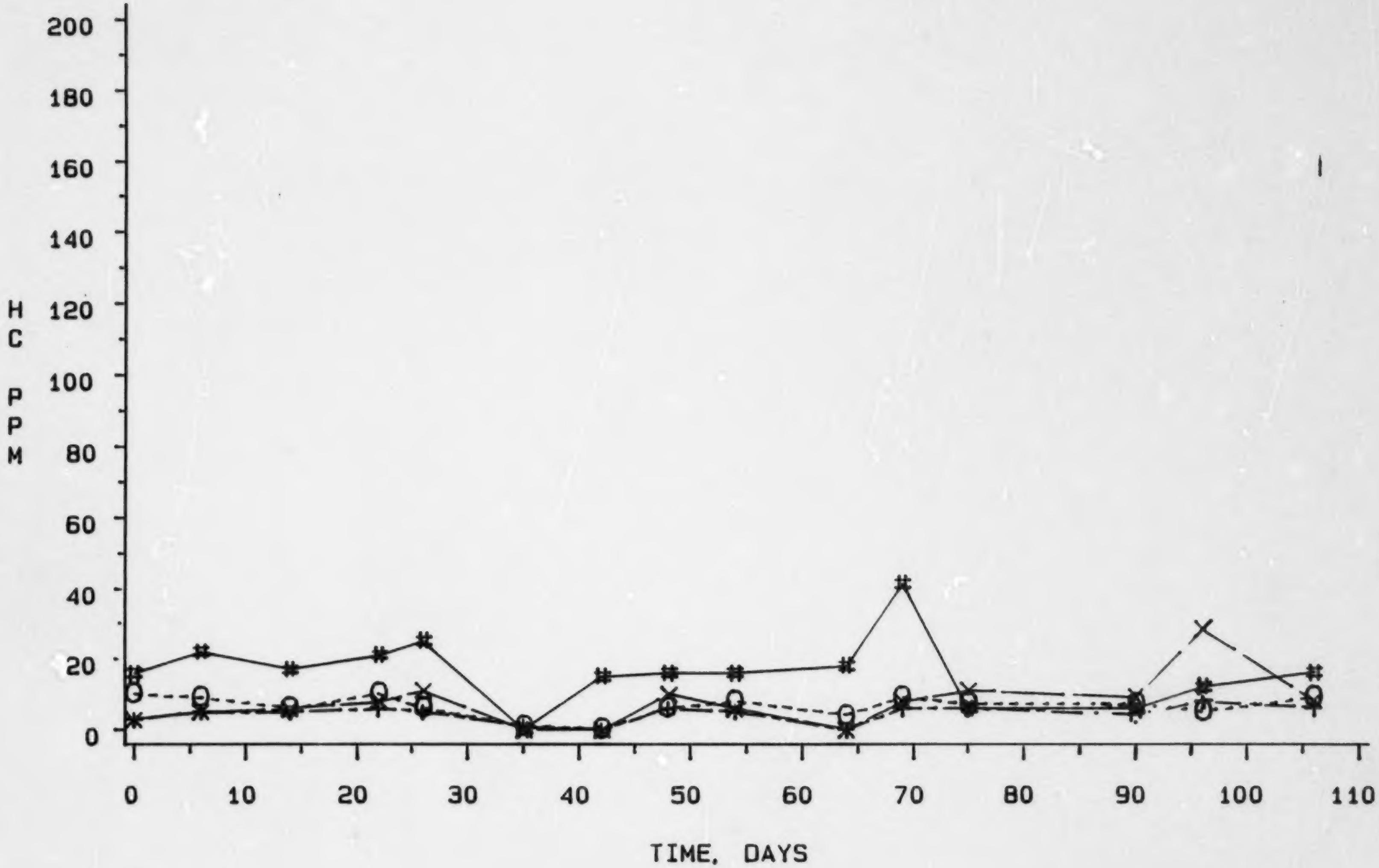
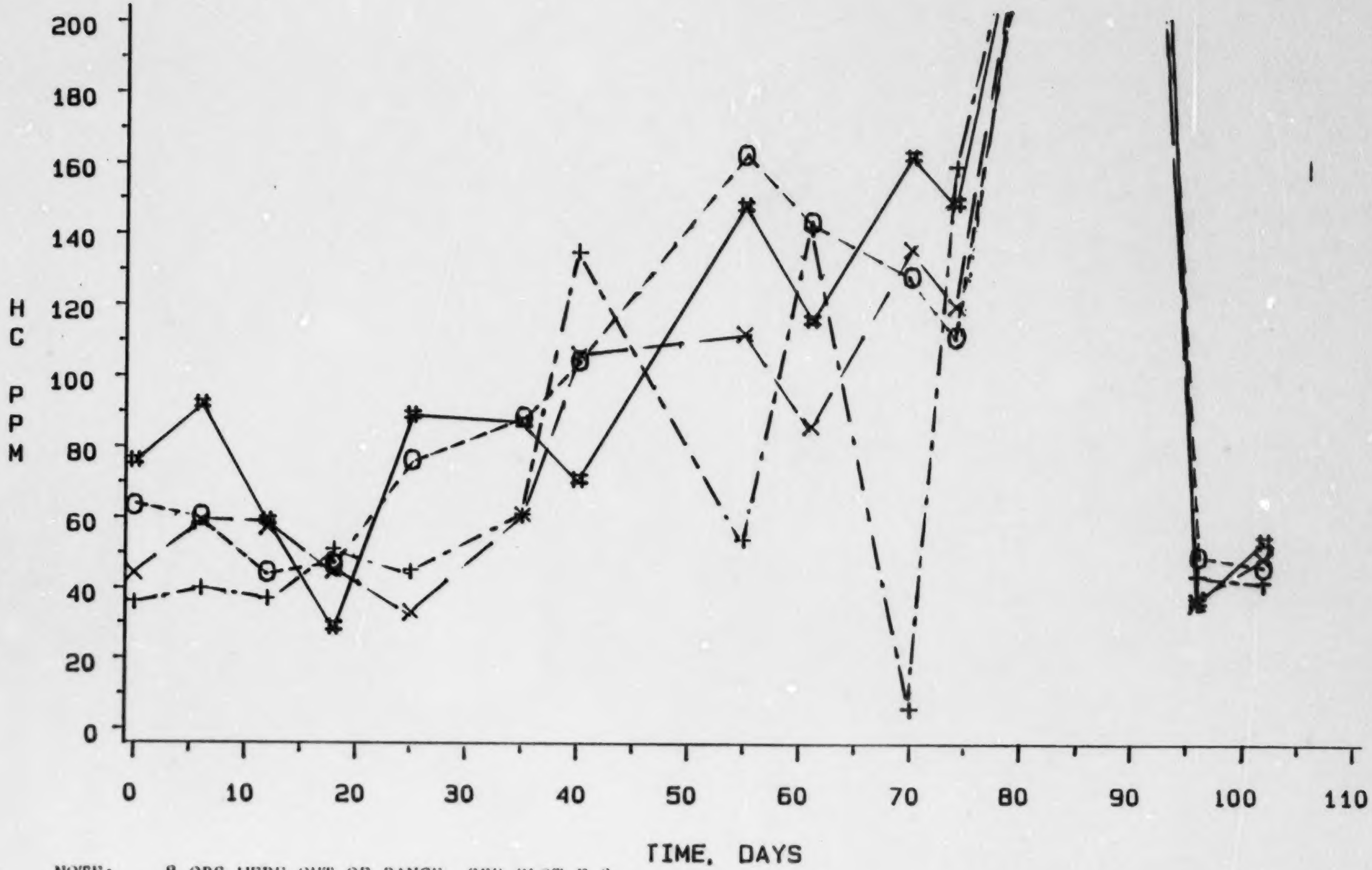


FIGURE E-15. VEHICLE 15 - 1987 HYUNDAI EXCEL GS, HC-2500 RPM VS TIME



NOTE: 8 OBS WERE OUT OF RANGE, SEE PLOT F-3

FIGURE E-16. VEHICLE 16 - 1986 FORD THUNDERBIRD, HC-2500 RPM VS TIME

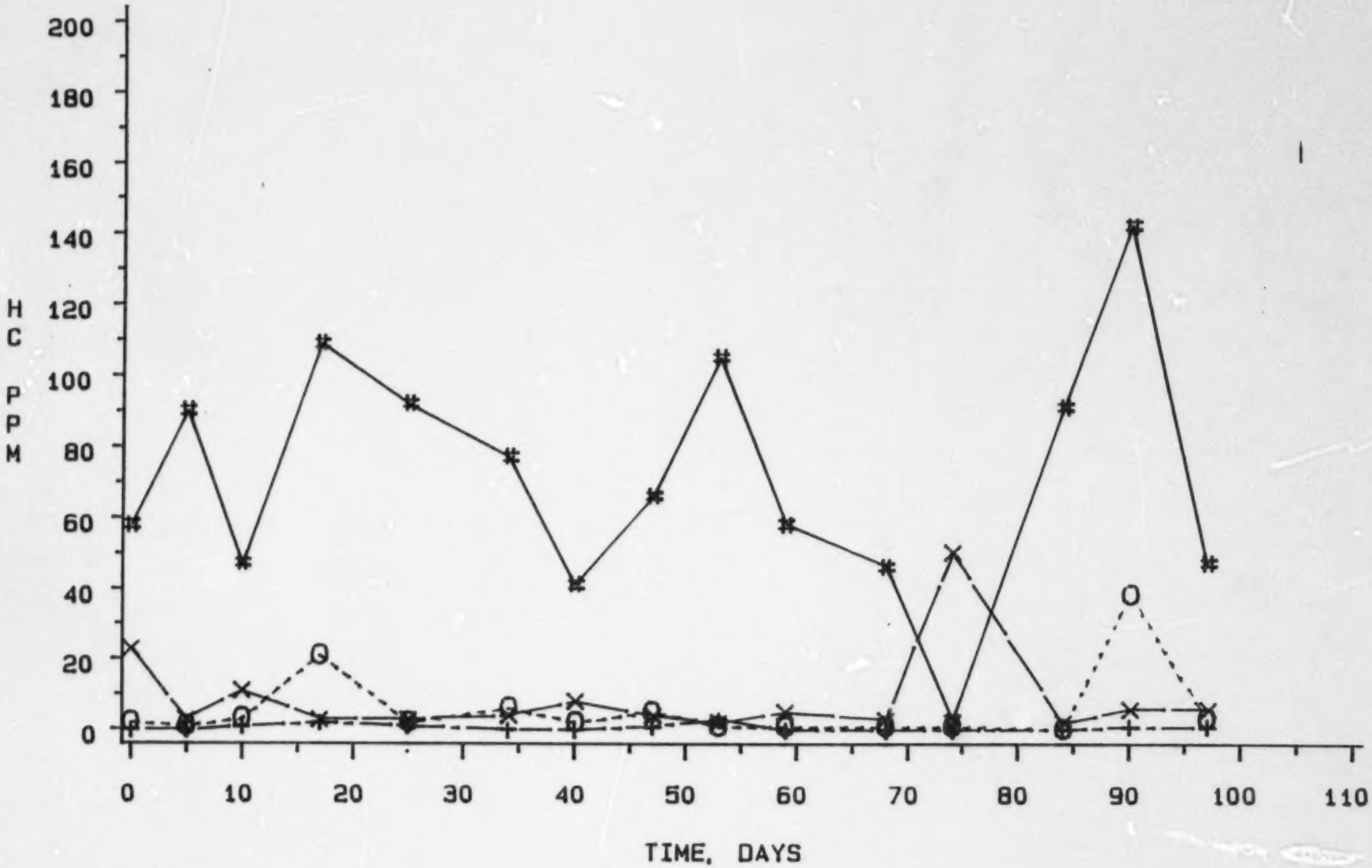


FIGURE E-17. VEHICLE 17 - 1984 FORD E-150, HC-2500 RPM VS TIME

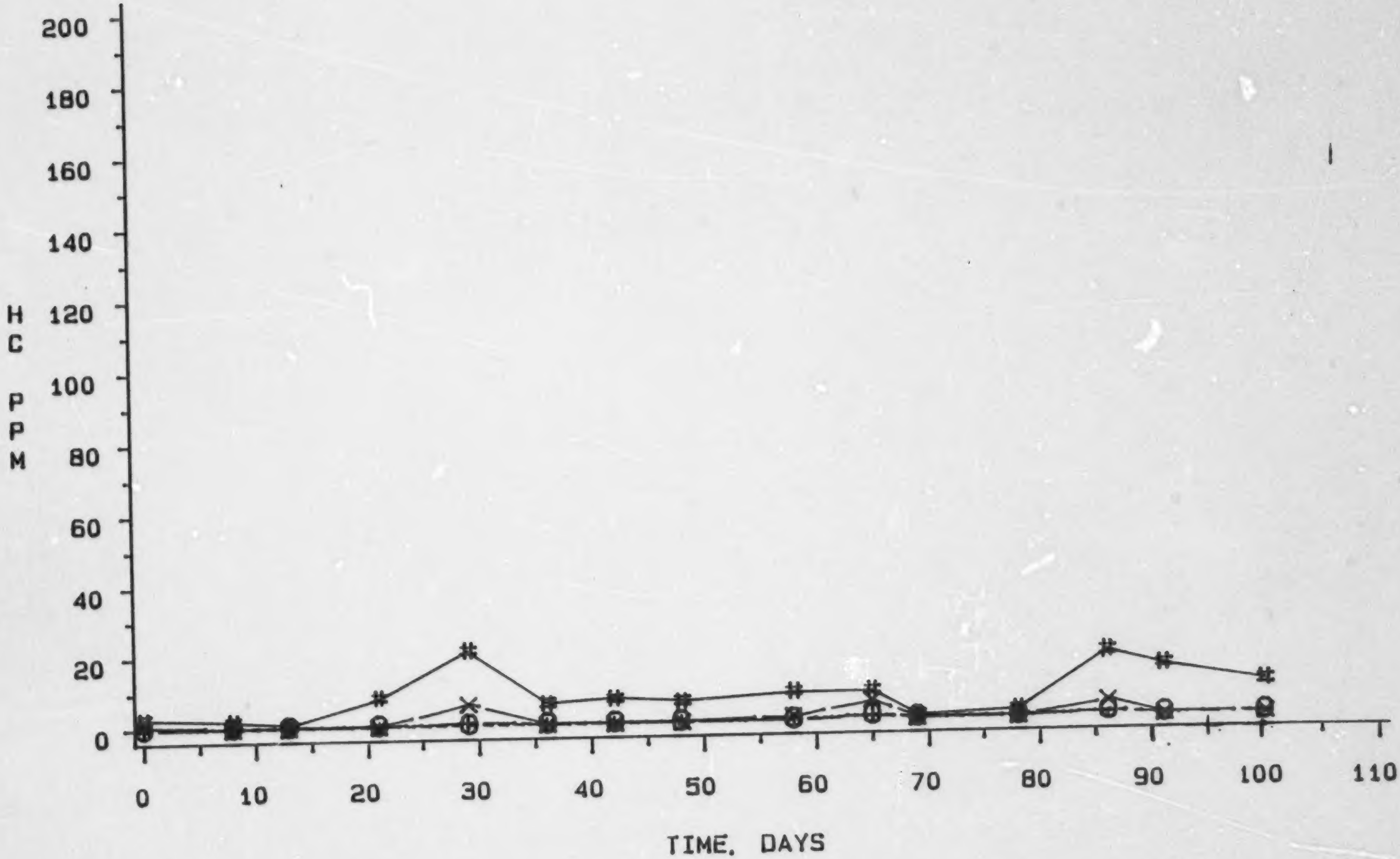


FIGURE E-18. VEHICLE 18 - 1984 CHEVROLET CAPRICE CLASSIC, HC-2500 RPM VS TIME

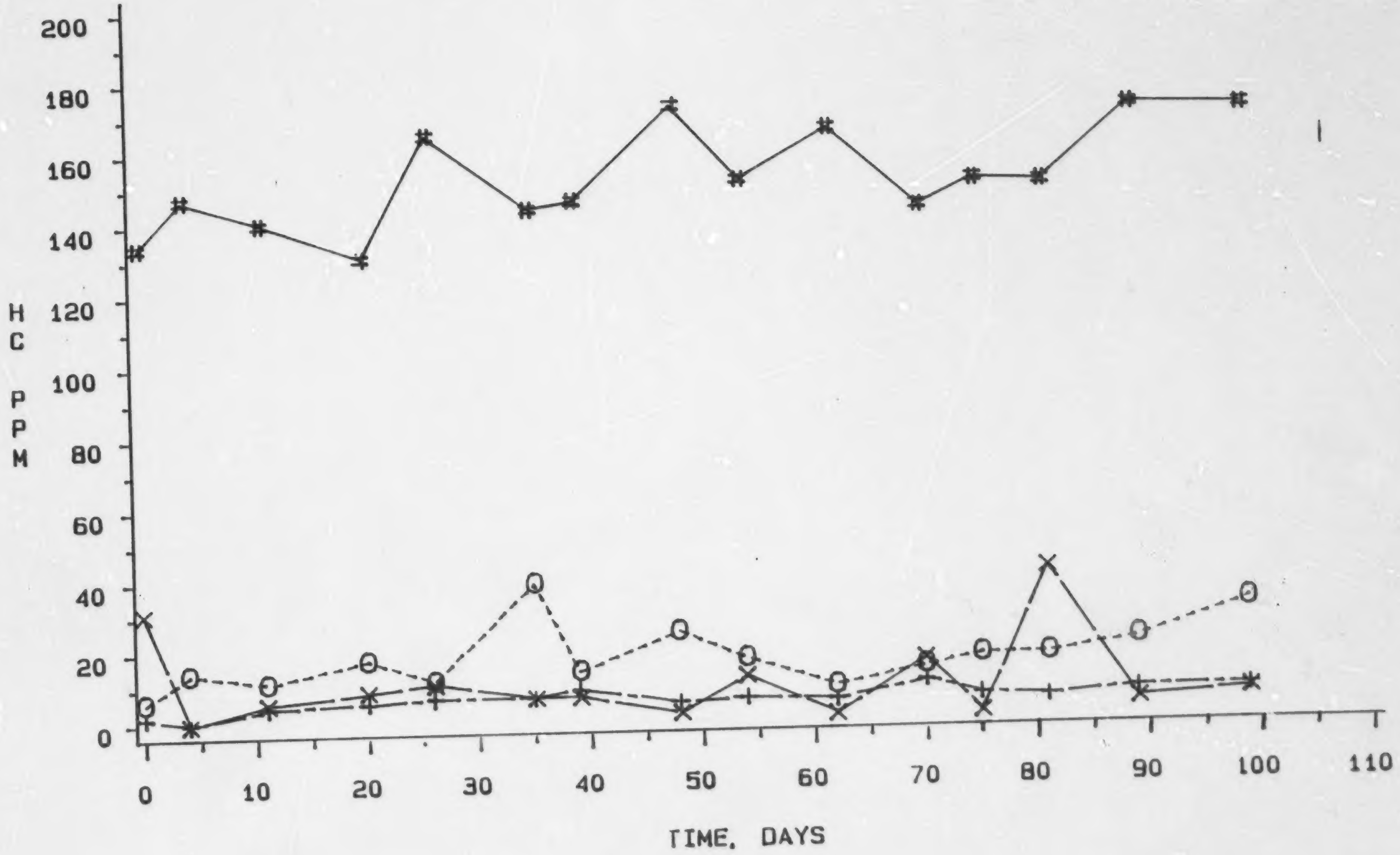


FIGURE E-19. VEHICLE 19 - 1985 CHEVROLET CAVALIER, HC-2500 RPM VS TIME

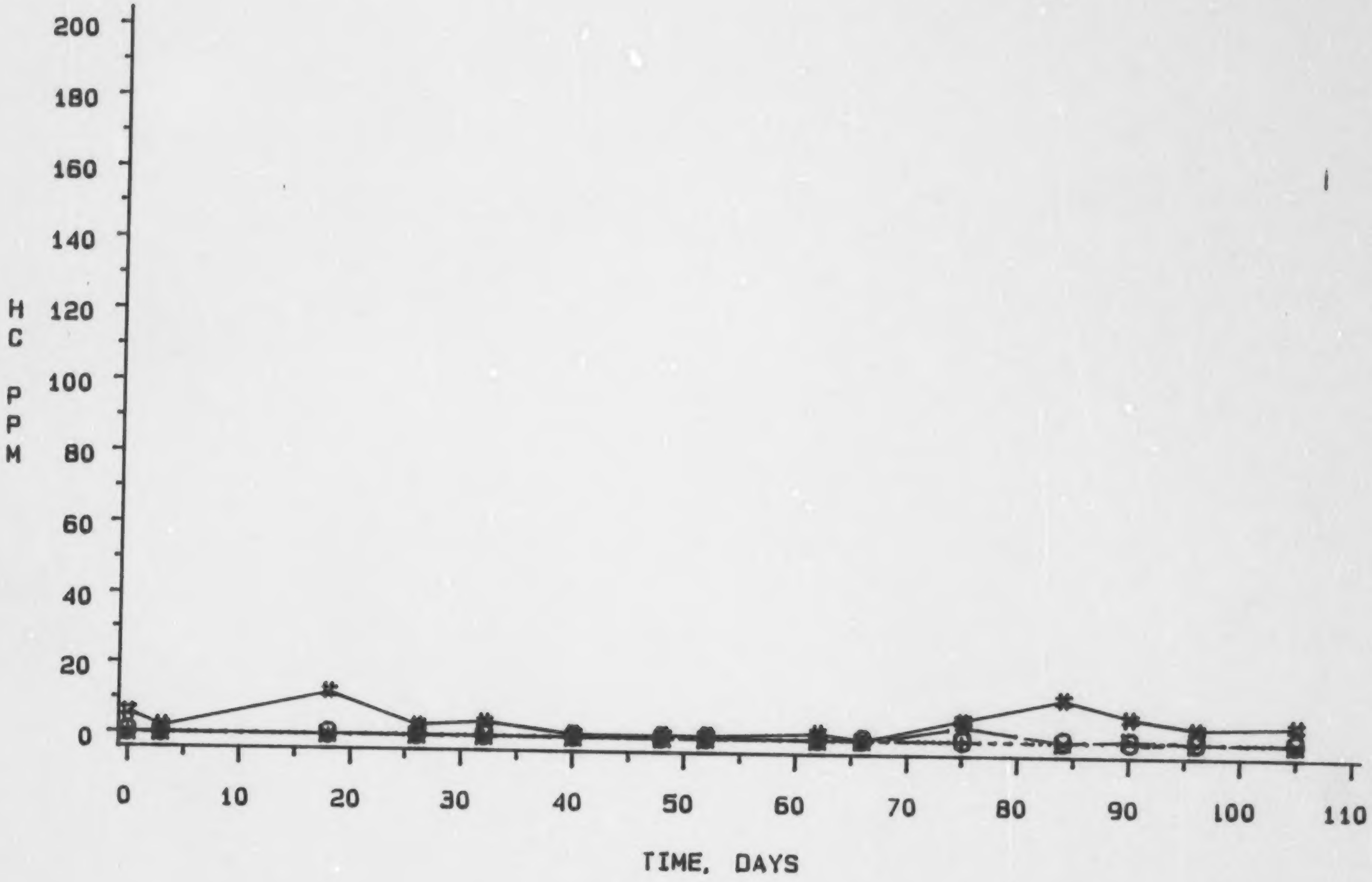


FIGURE E-20. VEHICLE 20 - 1987 BUICK LESABRE, HC-2500 RPM VS TIME

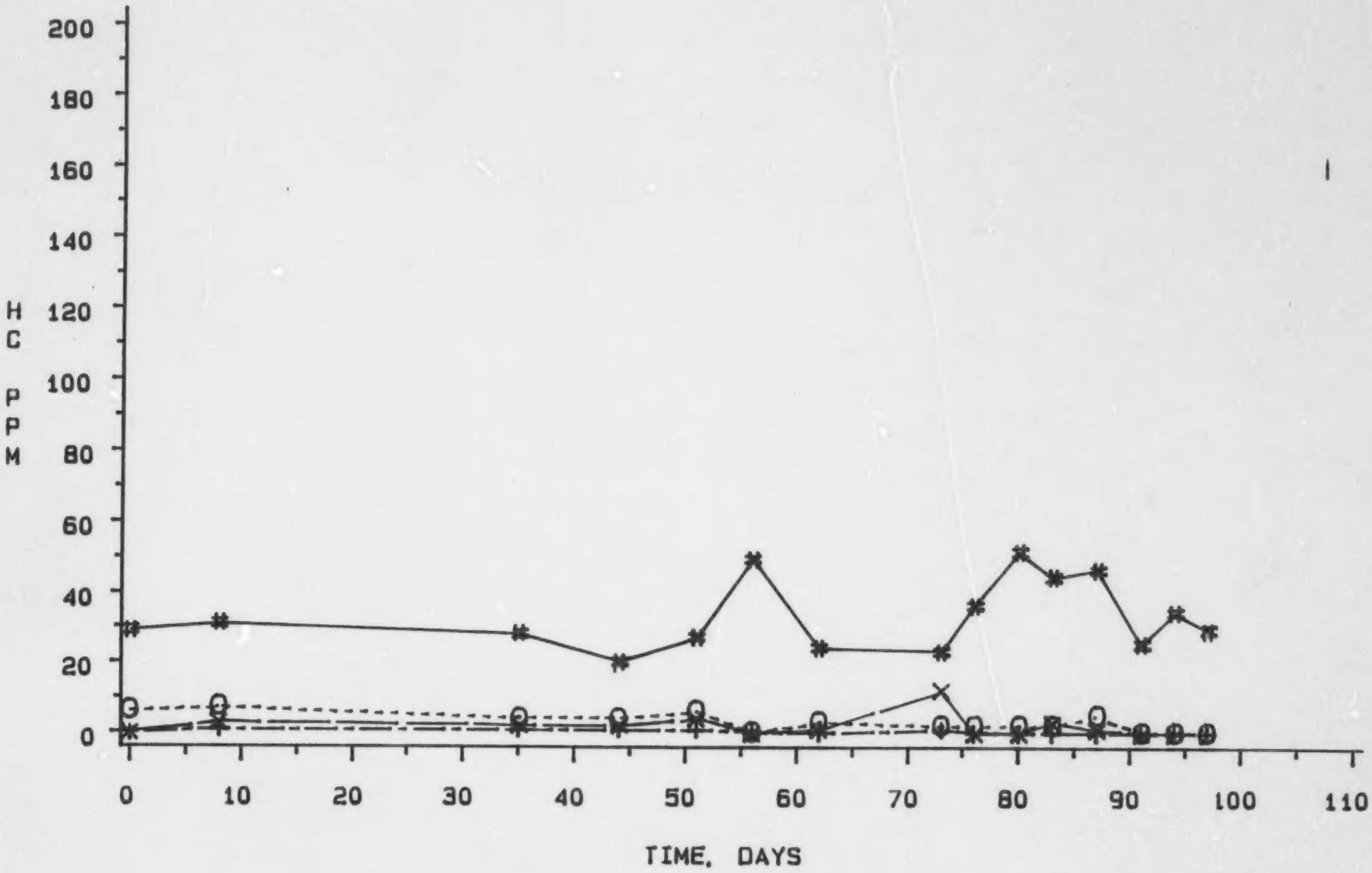


FIGURE E-21. VEHICLE 21 - 1982 VOLKSWAGEN SCIRROCO, HC-2500 RPM VS TIME

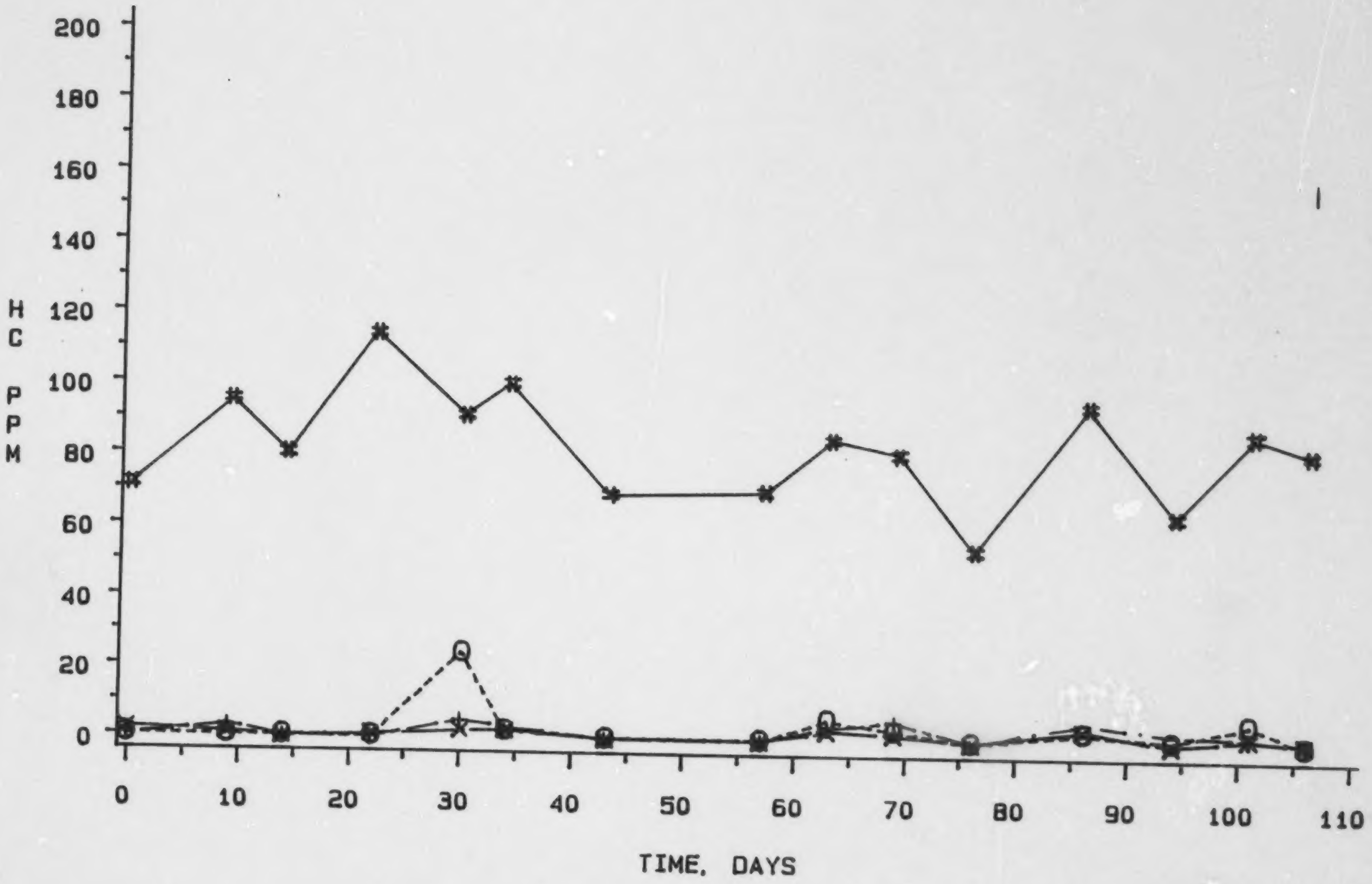


FIGURE E-22. VEHICLE 22 - 1987 CHEVROLET ASTRO, HC-2500 RPM VS TIME

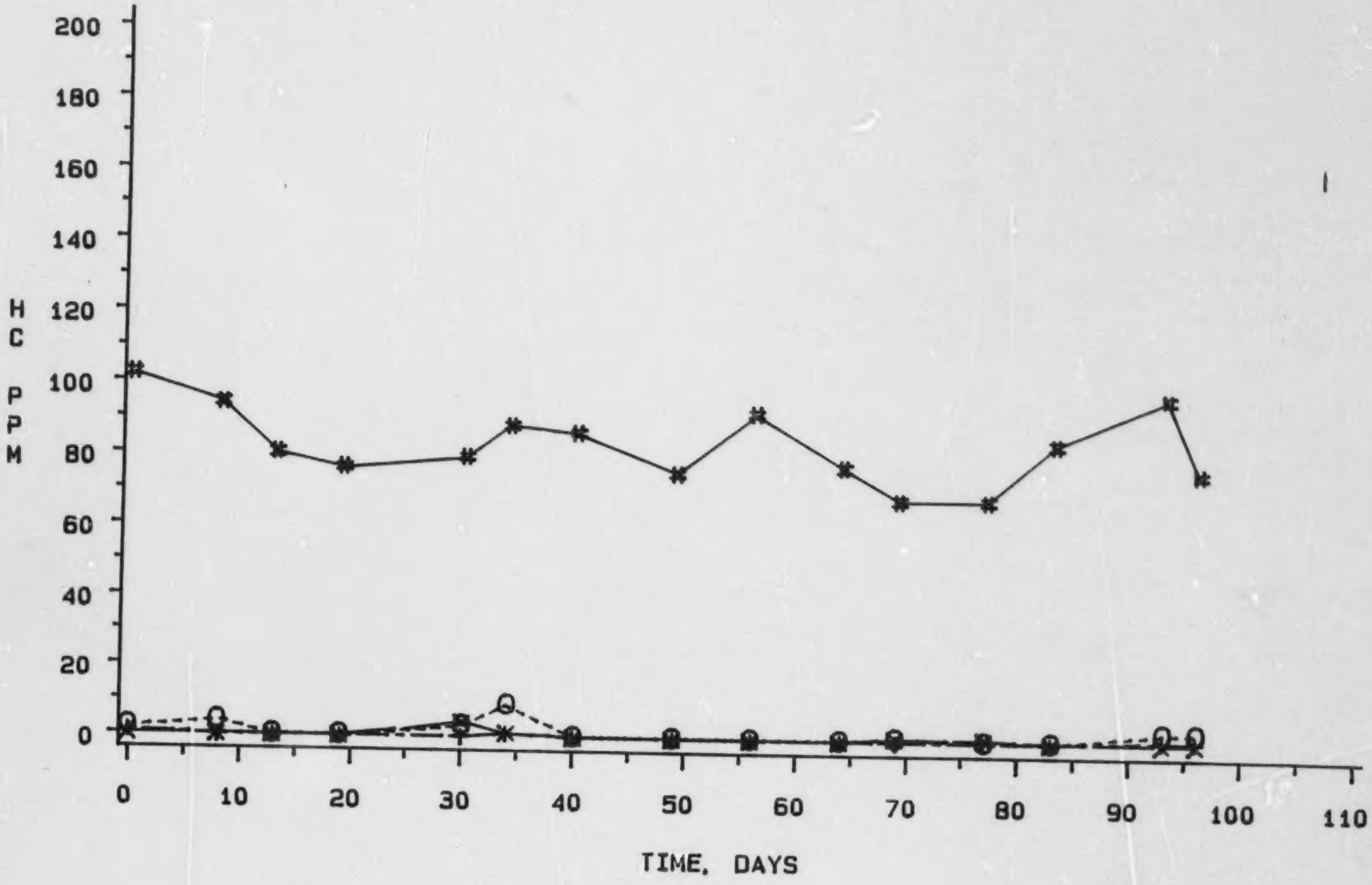


FIGURE E-23. VEHICLE 23 - 1987 NISSAN PULSAR, HC-2500 RPM VS TIME

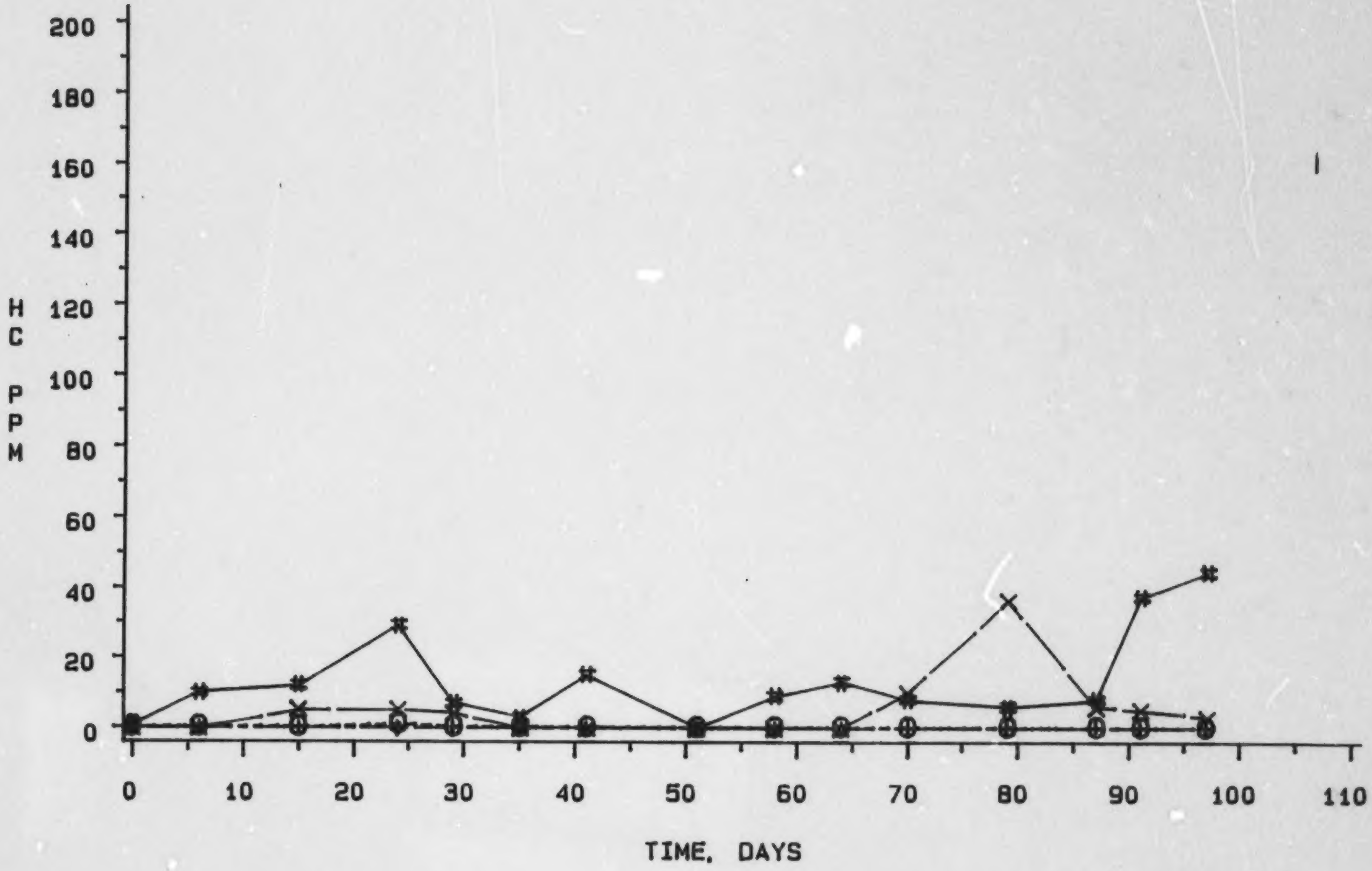


FIGURE E-24. VEHICLE 24 - 1986 BUICK CENTURY, HC-2500 RPM VS TIME

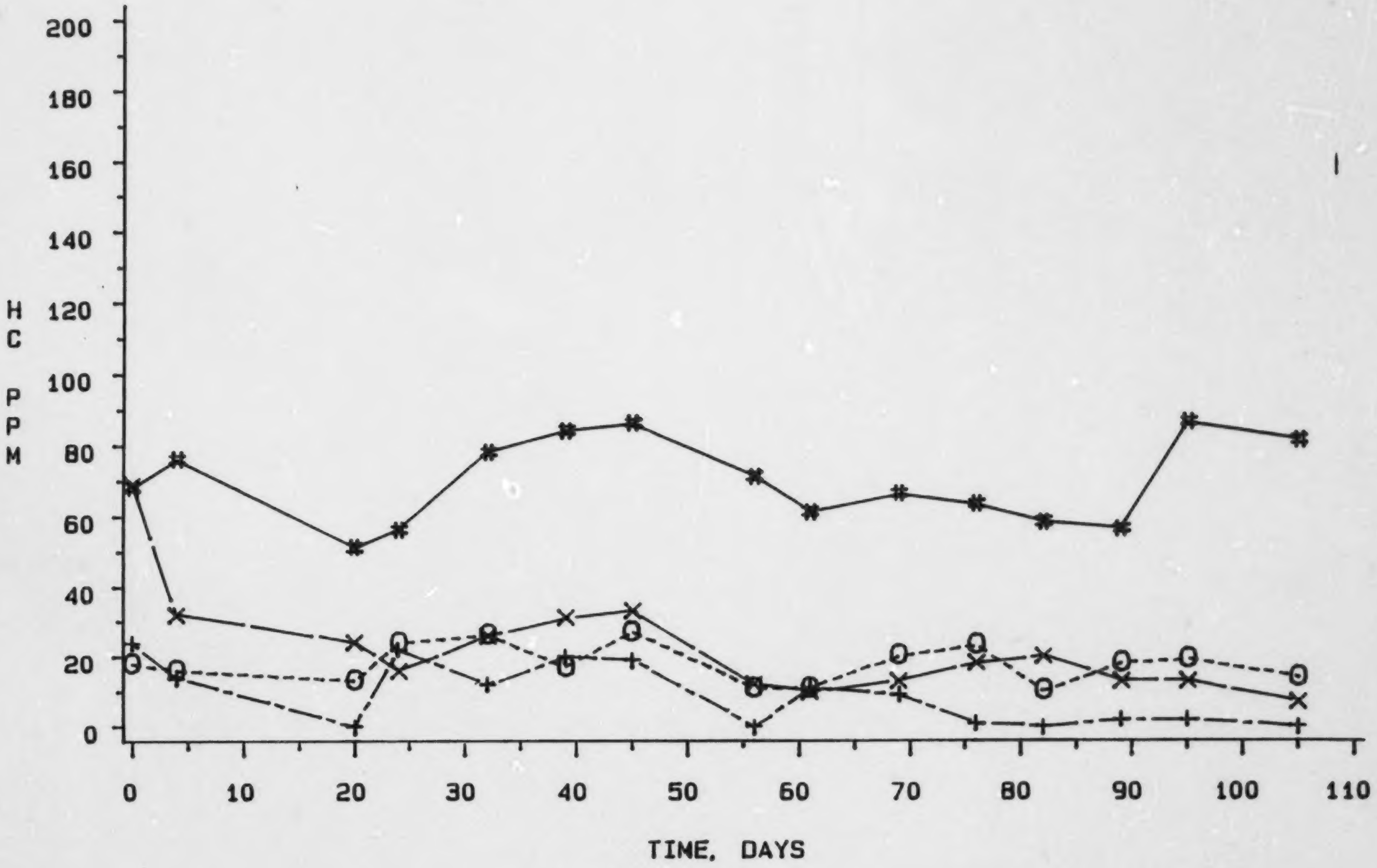


FIGURE E-25. VEHICLE 25 - 1982 VOLVO 240 DL, HC-2500 RPM VS TIME

APPENDIX F

REPLOTS OF HC-2500 RPM EMISSIONS VERSUS TIME 0-600 PPM OR 0-1500 PPM SCALE

Figure F-	Vehicle No.	Vehicle Make and Model
1	02	Dodge Ramcharger
2	05	Honda Civic
3	16	Ford Thunderbird

Legend for Plots

x - Before 2500 rpm conditioning - am
+ - After 2500 rpm conditioning - am
# - Before 2500 rpm conditioning - pm
0 - After 2500 rpm conditioning - pm

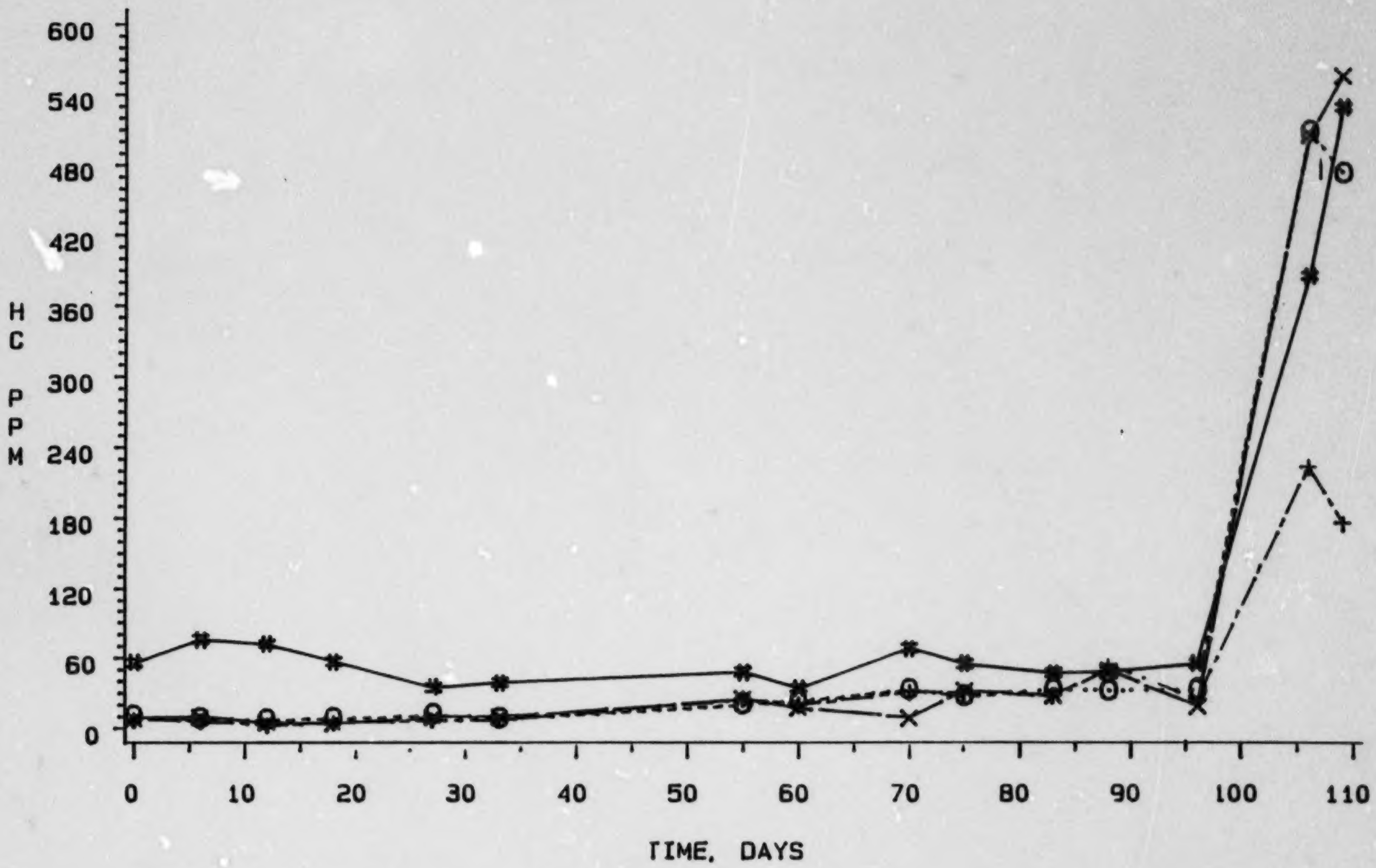


FIGURE F-1. VEHICLE 2 - 1984 DODGE RAMCHARGER, HC-2500 RPM VS TIME

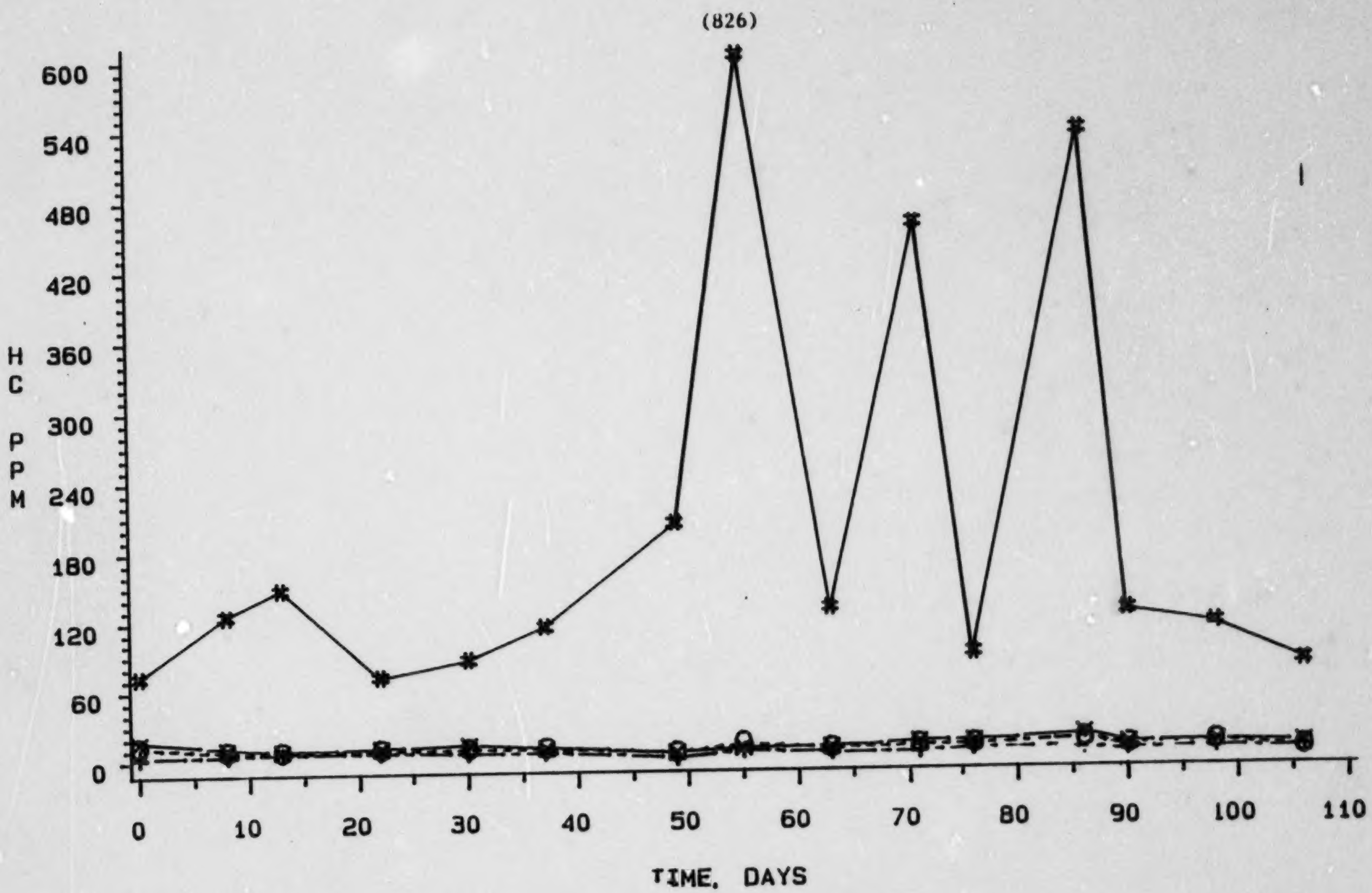


FIGURE F-2. VEHICLE 5 - 1981 HONDA CIVIC, HC-2500 RPM VS TIME

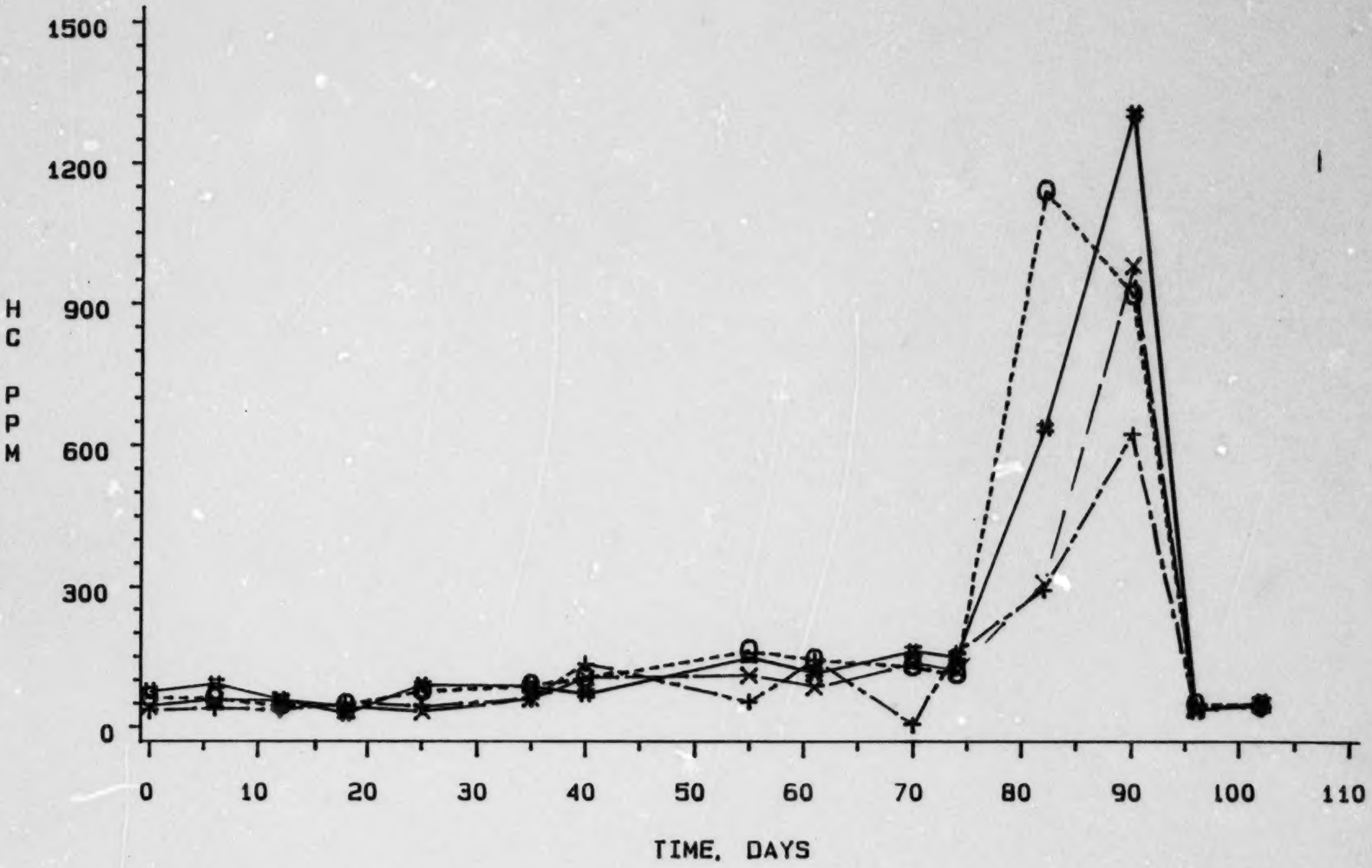


FIGURE F-3. VEHICLE 16 - 1986 FORD THUNDERBIRD, HC-2500 RPM VS TIME

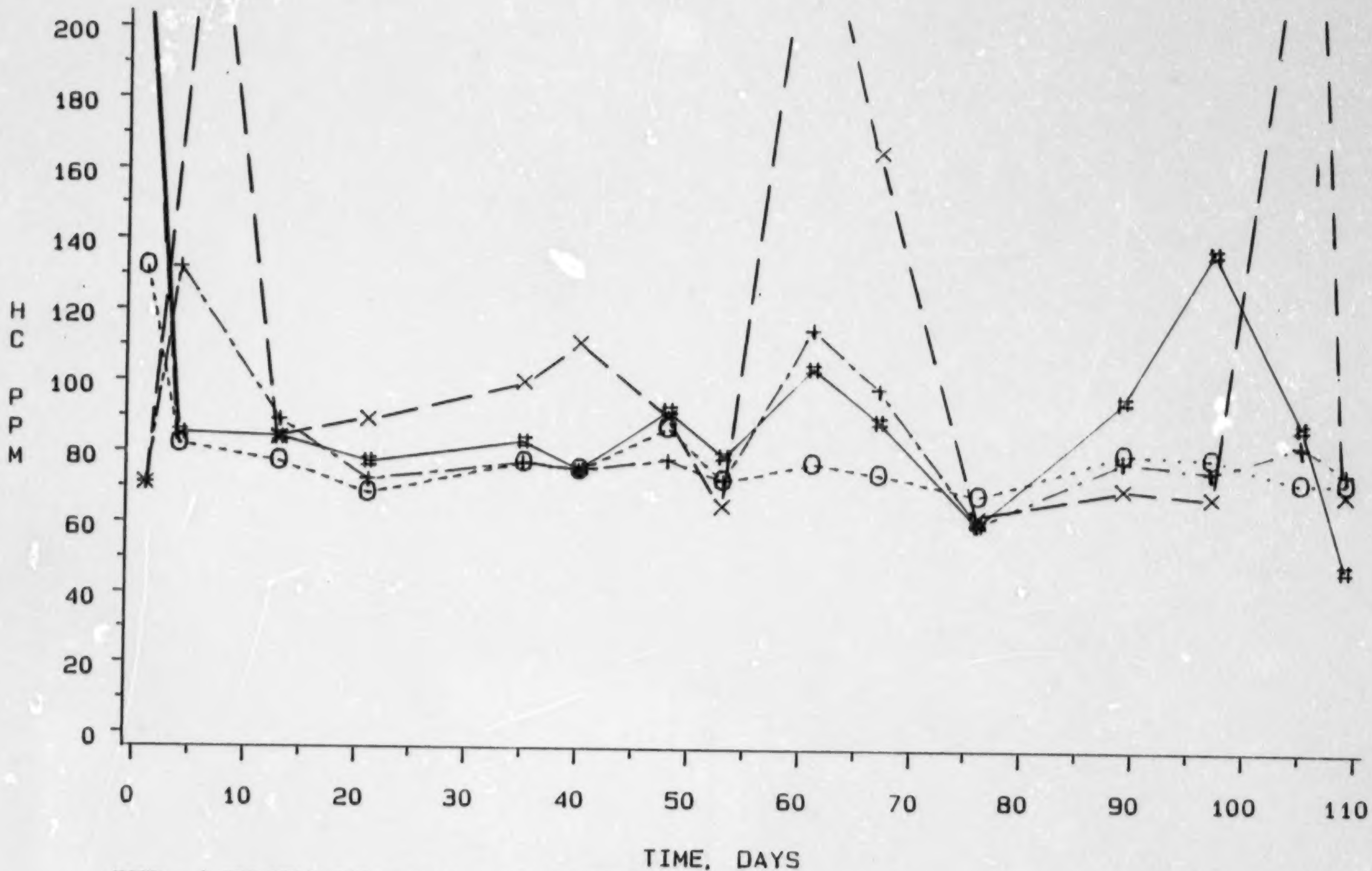
APPENDIX G

PLOTS OF HC-IDLE EMISSIONS VERSUS TIME
0-200 PPM SCALE

Figure G-	Vehicle No.	Vehicle Make and Model
1	01	Mercury Zephyr
2	02	Dodge Ramcharger
3	03	Oldsmobile Delta 88
4	04	Chevrolet Silverado
5	05	Honda Civic
6	06	Honda Accord
7	07	Jeep Cherokee
8	08	Peugeot 505
9	09	Volkswagen Golf
10	10	BMW 318i
11	11	Nissan Pulsar
12	12	Chevrolet Suburban
13	13	Ford Ranger
14	14	Oldsmobile Cutlass Supreme
15	15	Hyundai Excel GLS
16	16	Ford Tunderbird
17	17	Ford E-150 Van
18	18	Chevrolet Caprice Classic
19	19	Chevrolet Cavalier
20	20	Buick LeSabre
21	21	Volkswagen Scirocco
22	22	Chevrolet Astro Van
23	23	Nissan Pulsar
24	24	Buick Century
25	25	Volvo 240 DL

Legend for Plots

x - Before 2500 rpm conditioning - am
+ - After 2500 rpm conditioning - am
# - Before 2500 rpm conditioning - pm
0 - After 2500 rpm conditioning - pm



NOTE: 4 OBS WERE OUT OF RANGE, SEE FIGURE H-1

FIGURE G-1. VEHICLE 1 - 1982 MERCURY ZEPHYR, HC-IDLE VS TIME

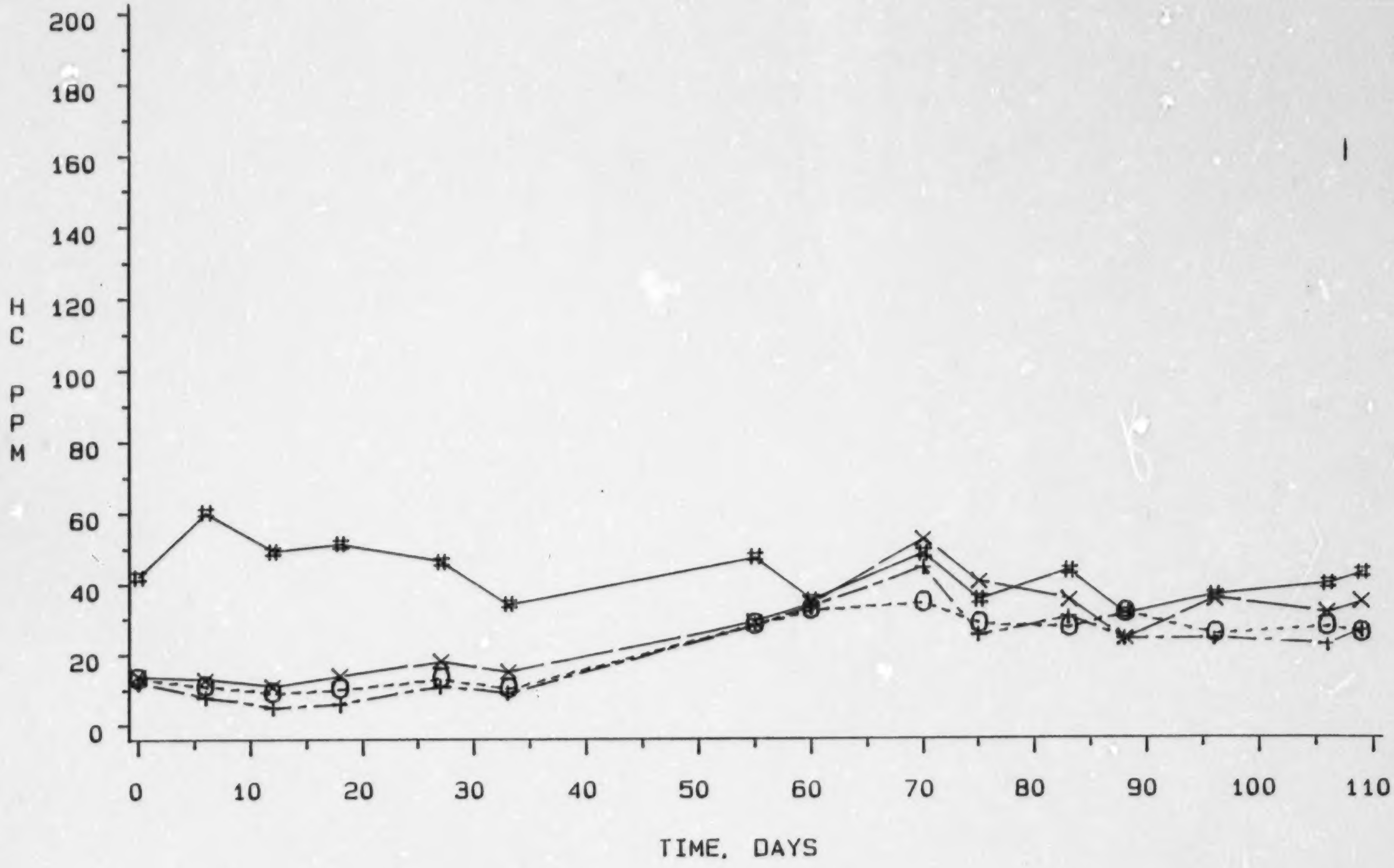


FIGURE G-2. VEHICLE 2 - 1984 DODGE RAMCHARGER, HC-IDLE VS TIME

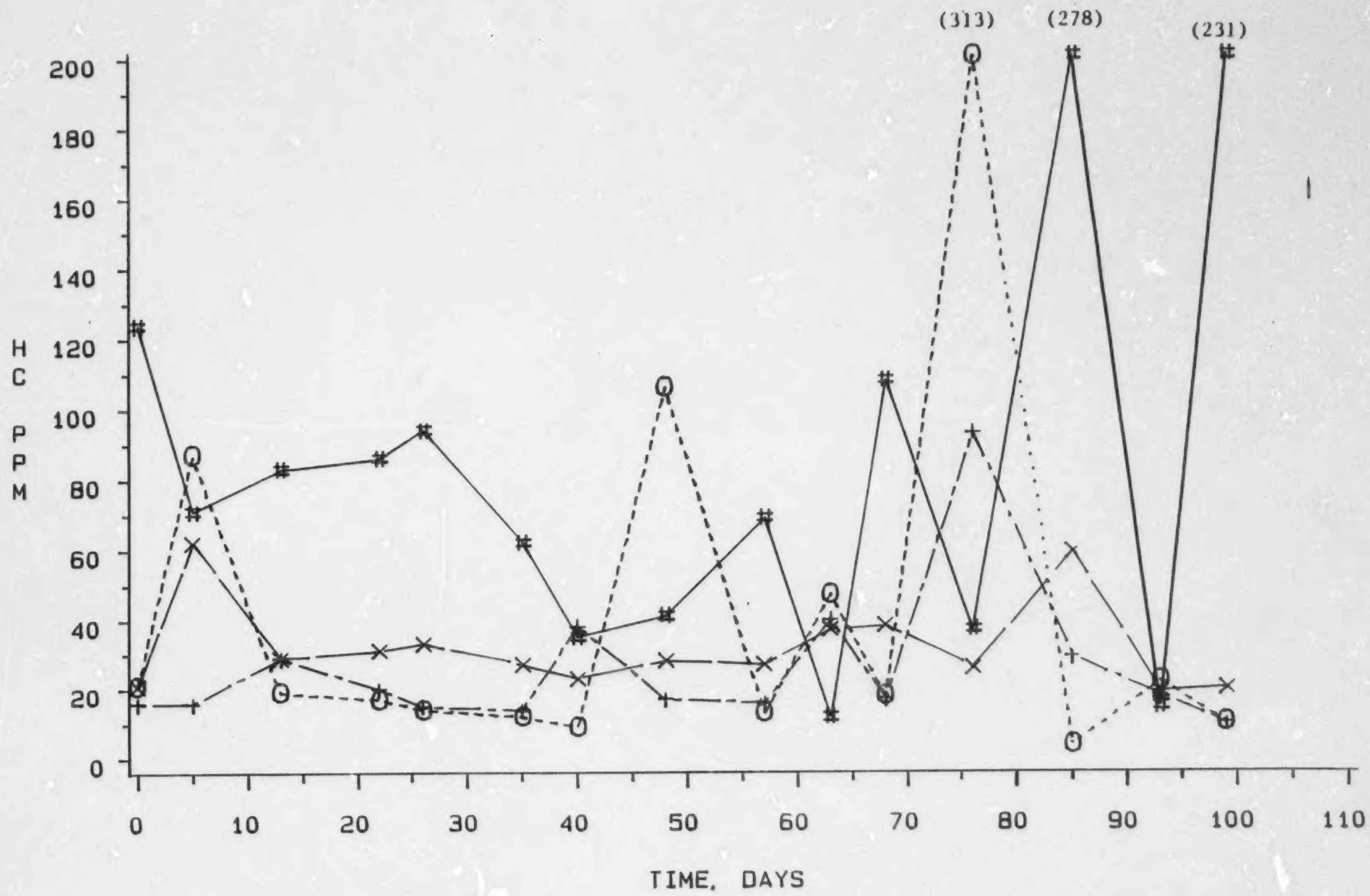


FIGURE G-3. VEHICLE 3 - 1984 OLDSMOBILE DELTA 88, HC-IDLE VS TIME

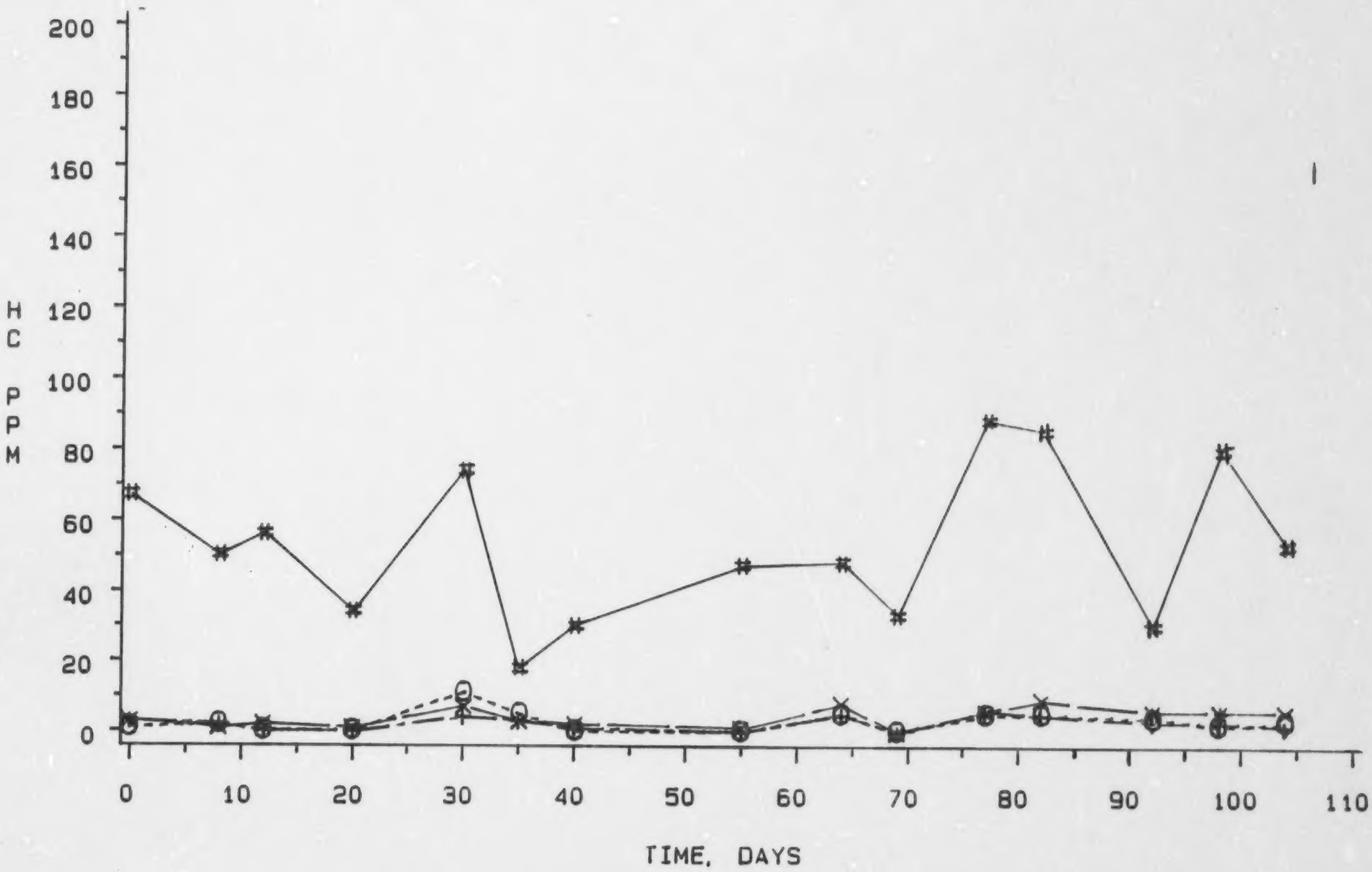


FIGURE G-4. VEHICLE 4 - 1984 CHEVROLET SILVERADO, HC-IDLE VS TIME

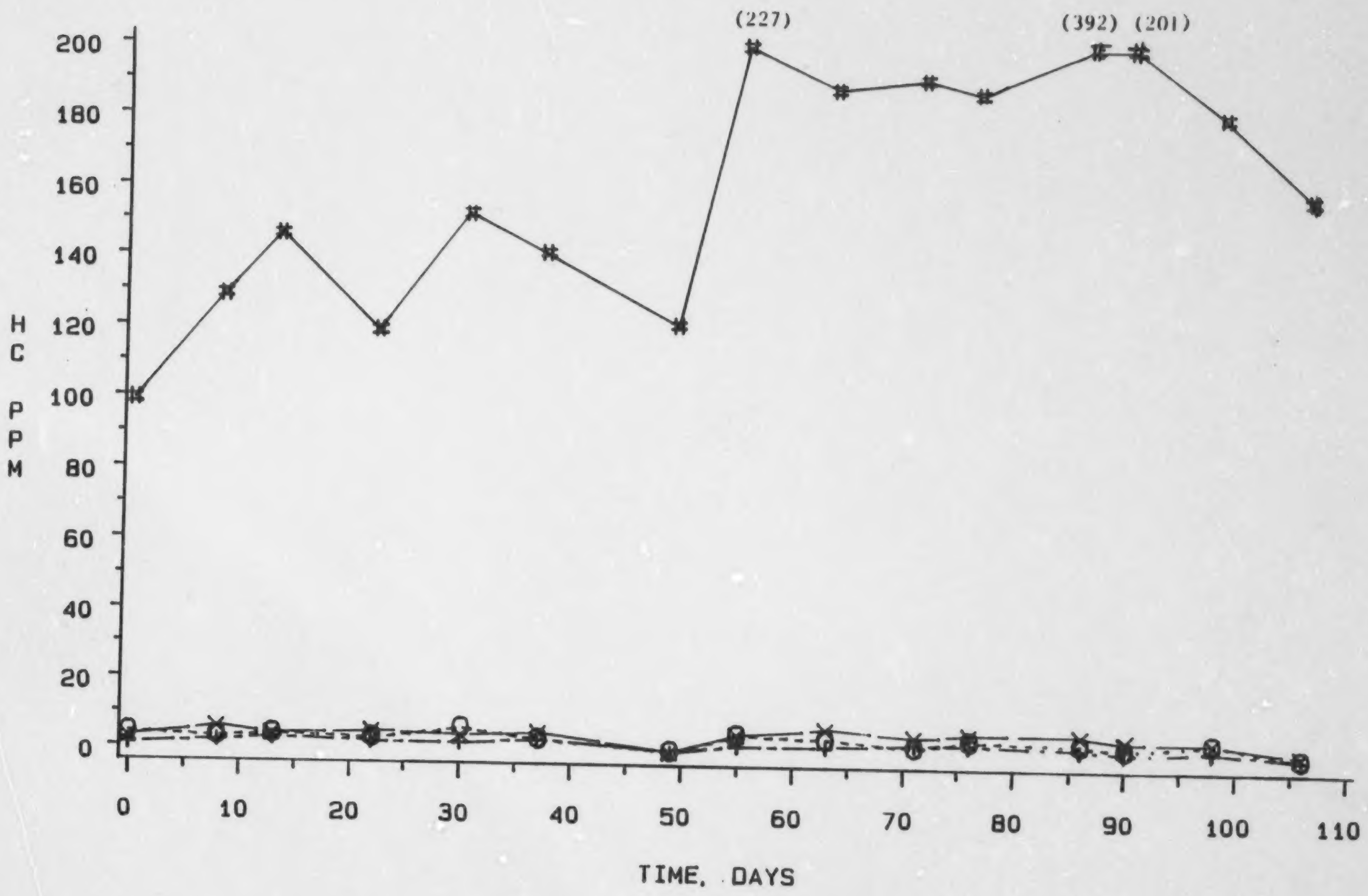


FIGURE G-5. VEHICLE 5 - 1981 HONDA CIVIC, HC-IDLE VS TIME

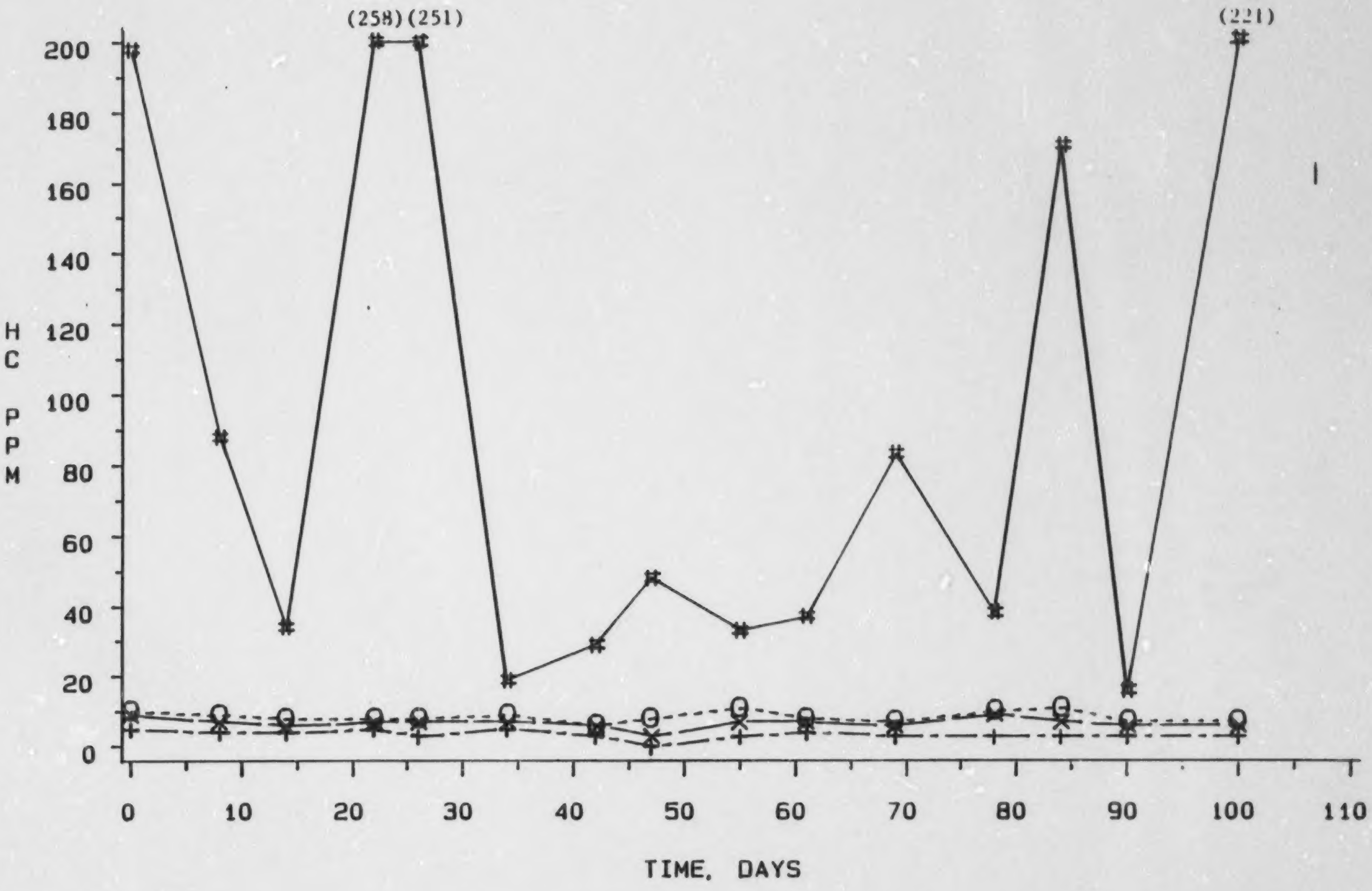


FIGURE G-6. VEHICLE 6 - 1985 HONDA ACCORD, HC-IDLE VS TIME

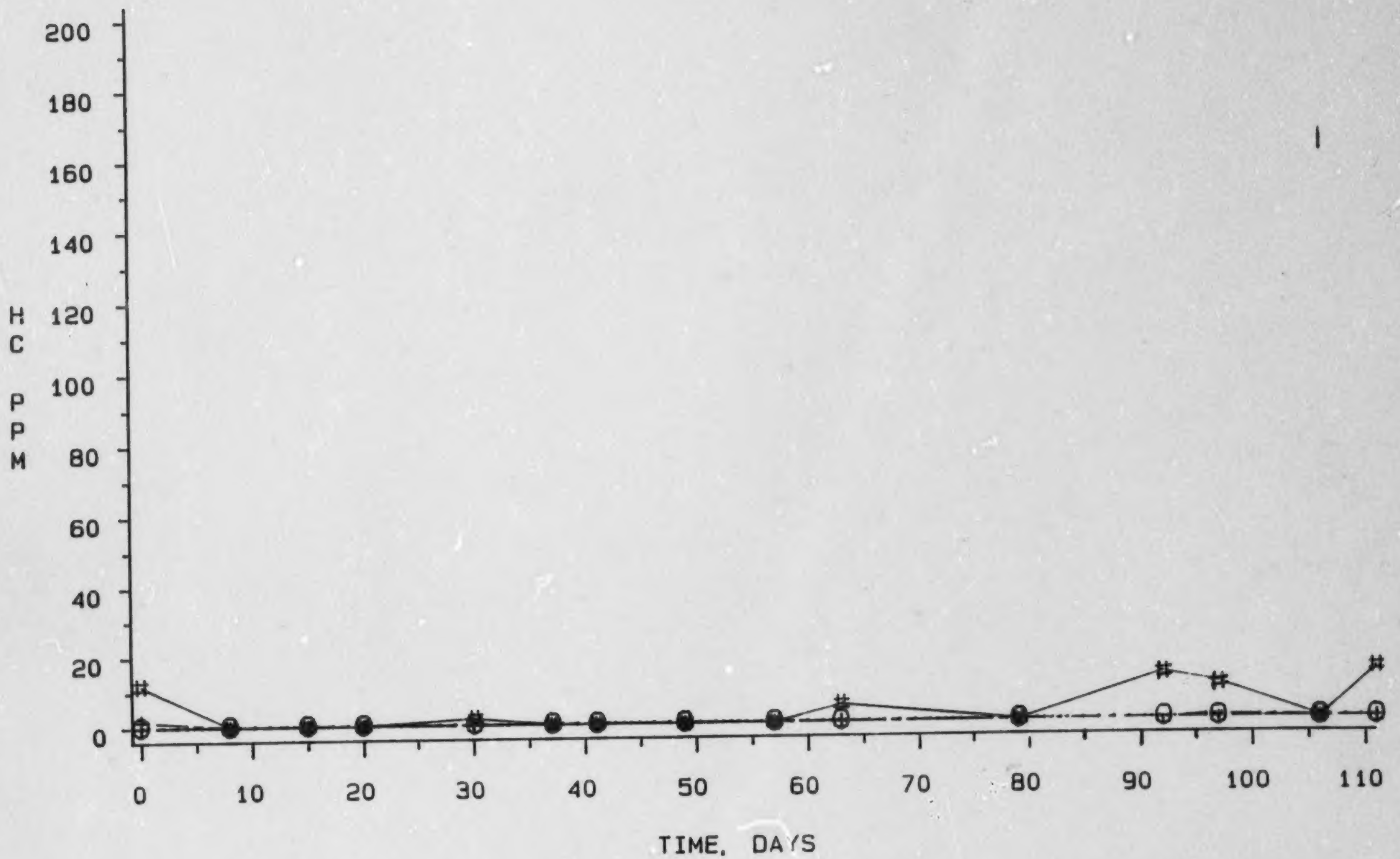


FIGURE G-7. VEHICLE 7 - 1987 JEEP CHEROKEE, HC-IDLE VS TIME

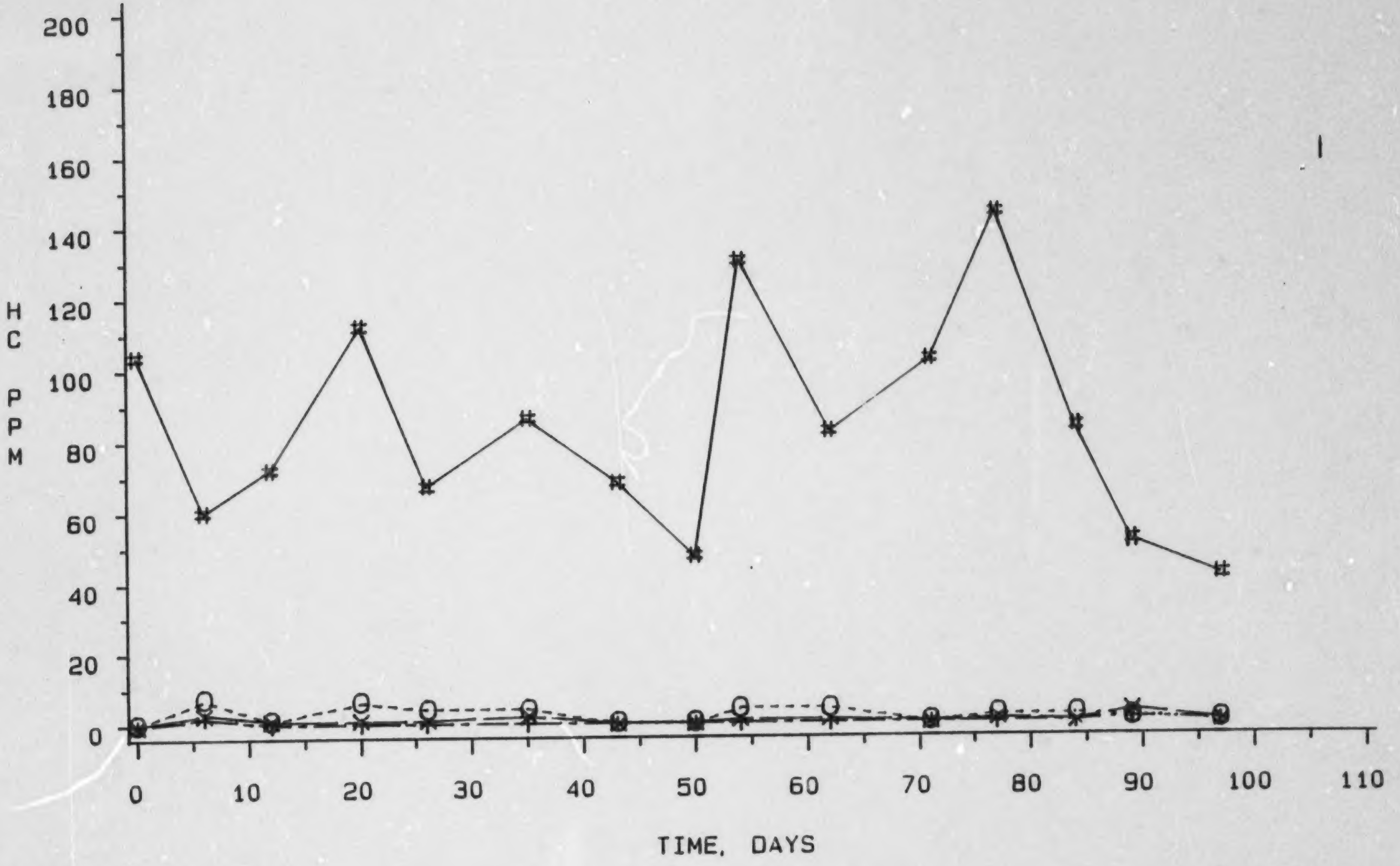


FIGURE G-8. VEHICLE 8 - 1982 PEUGEOT 505, HC-IDLE VS TIME

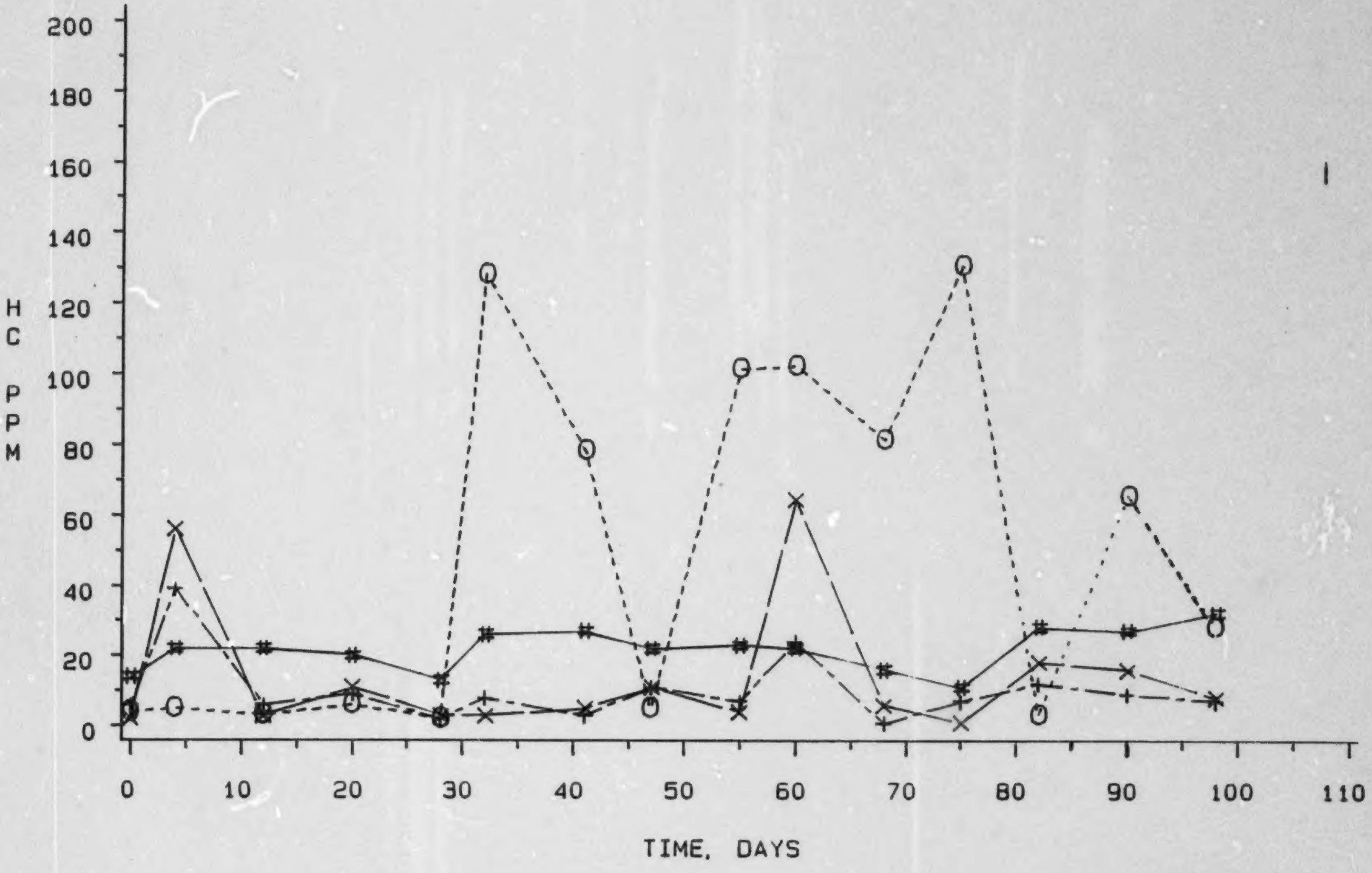
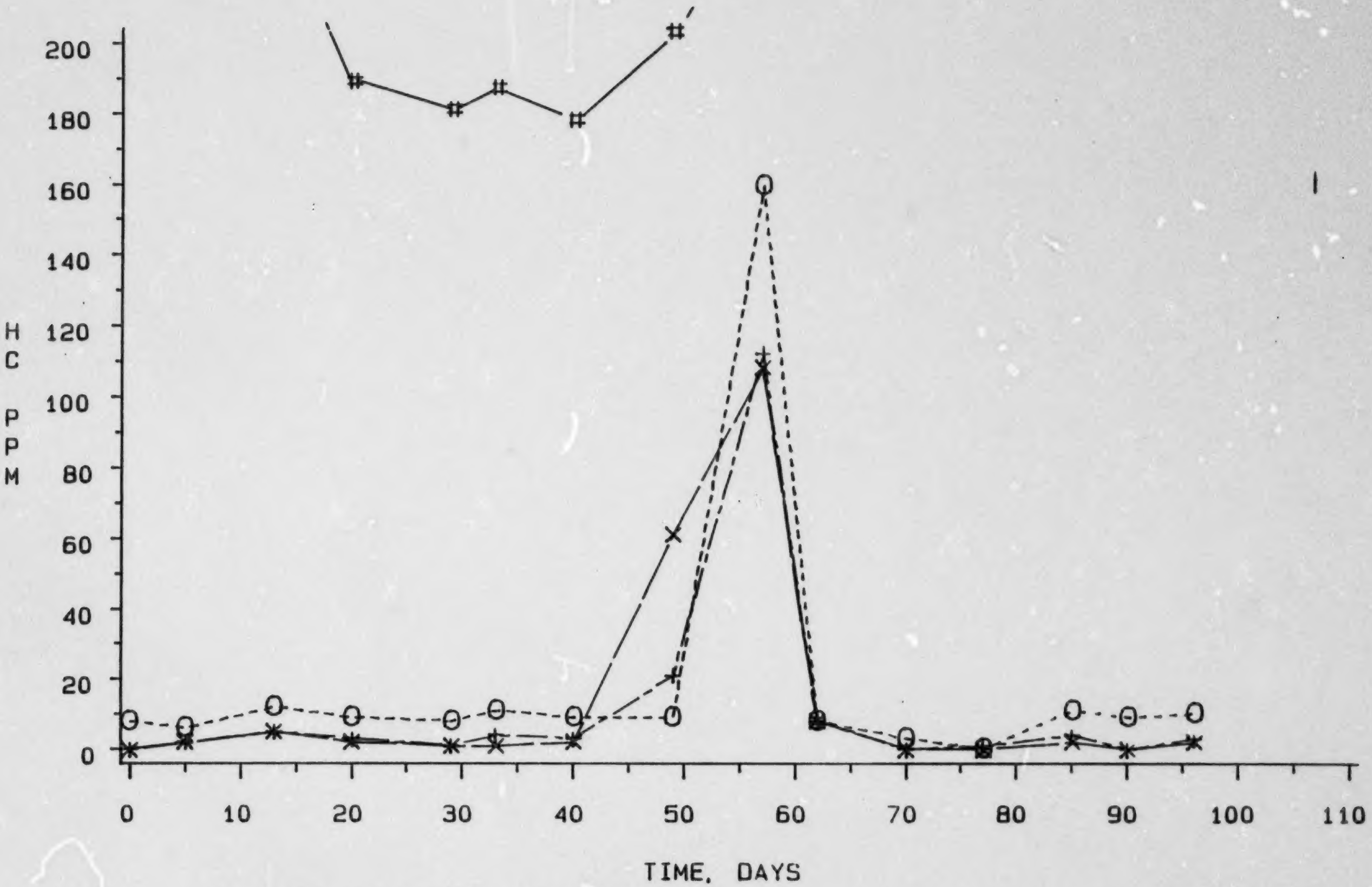


FIGURE G-9. VEHICLE 9 - 1985 VOLKSWAGEN GOLF, HC-IDLE VS TIME



NOTE: 10 OBS WERE OUT OF RANGE, SEE FIGURE H-2

FIGURE G-10. VEHICLE 10 - 1985 BMW 318i, HC-IDLE VS TIME

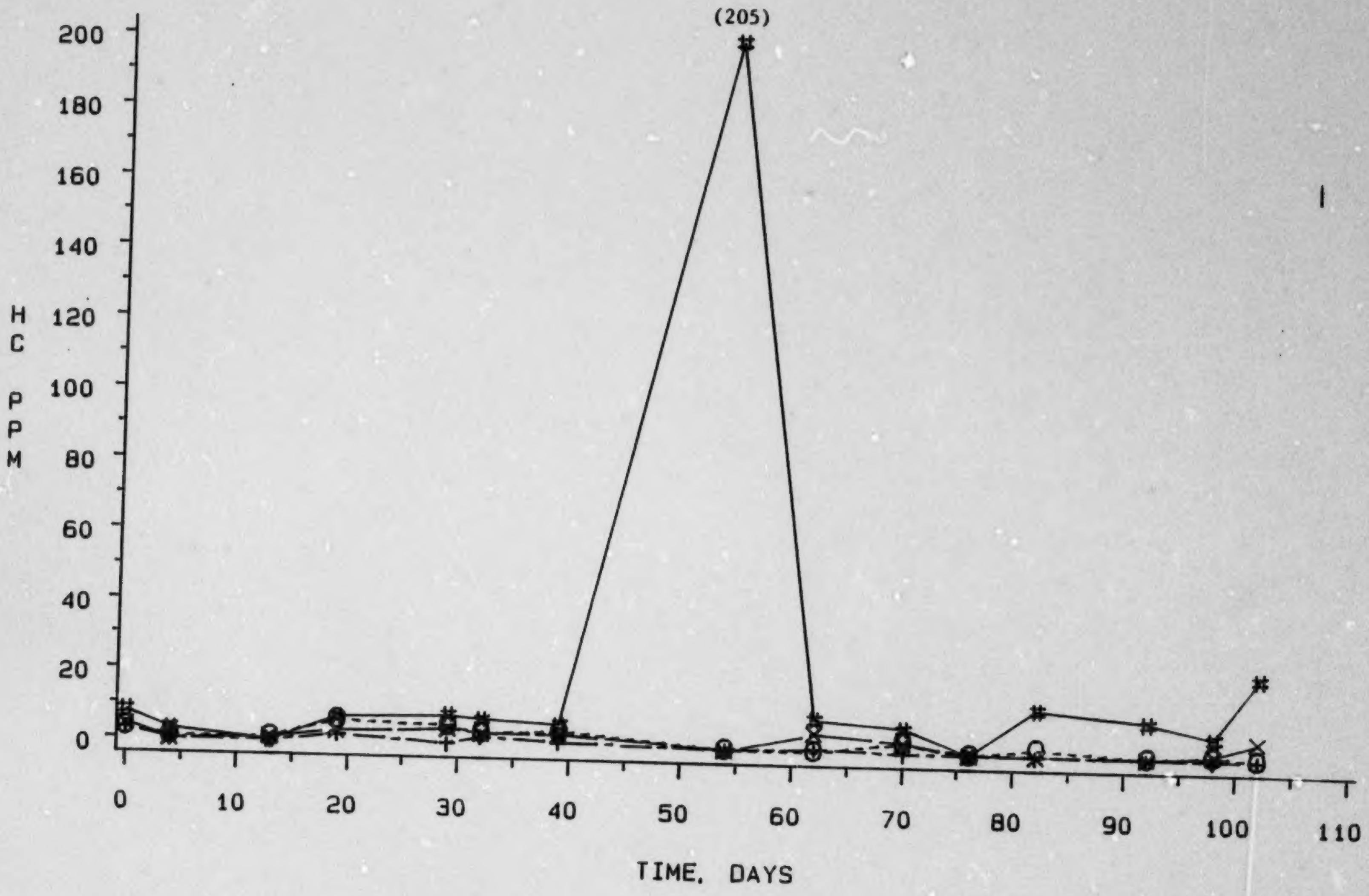


FIGURE G-11. VEHICLE 11 - 1986 NISSAN PULSAR, HC-IDLE VS TIME

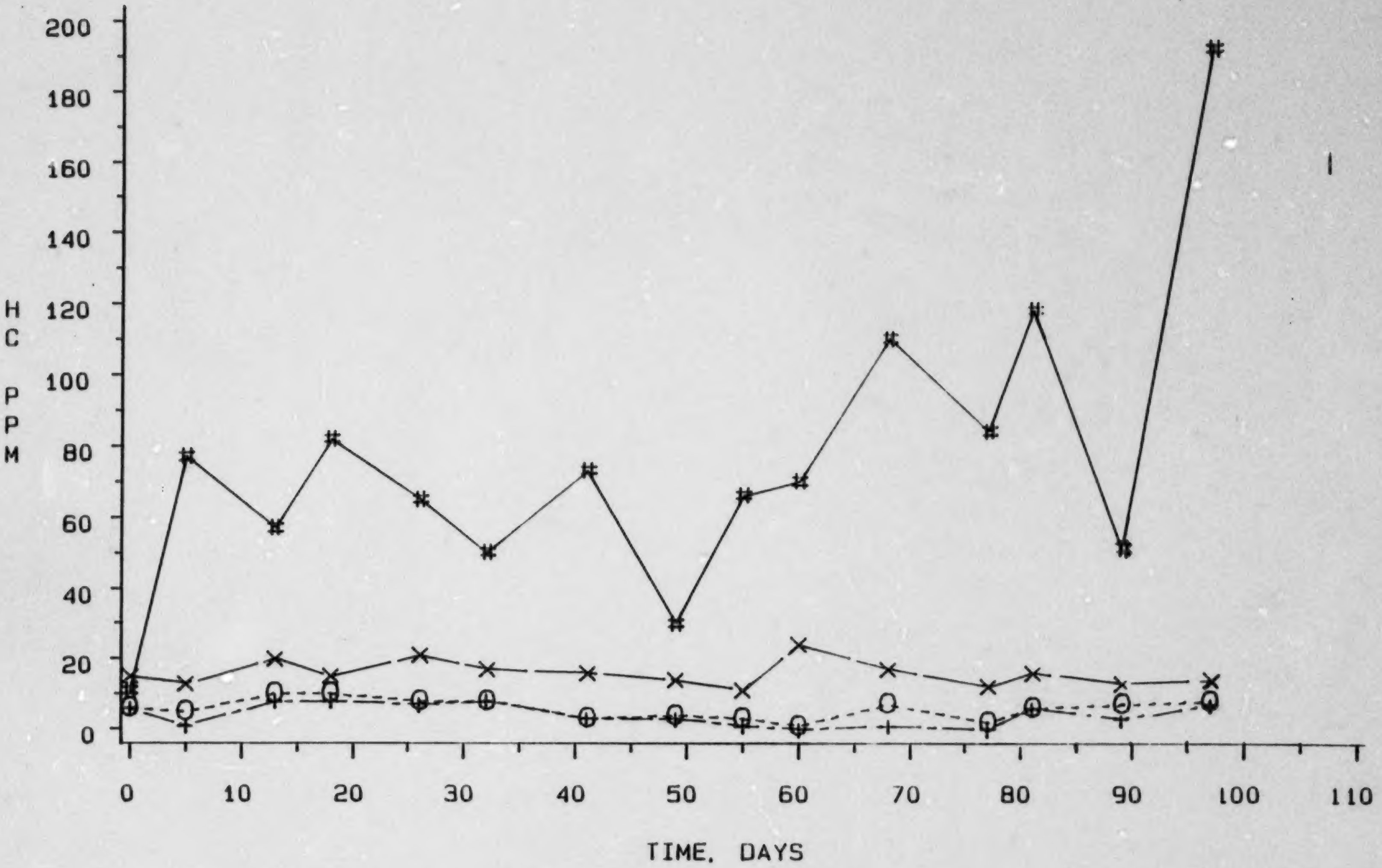
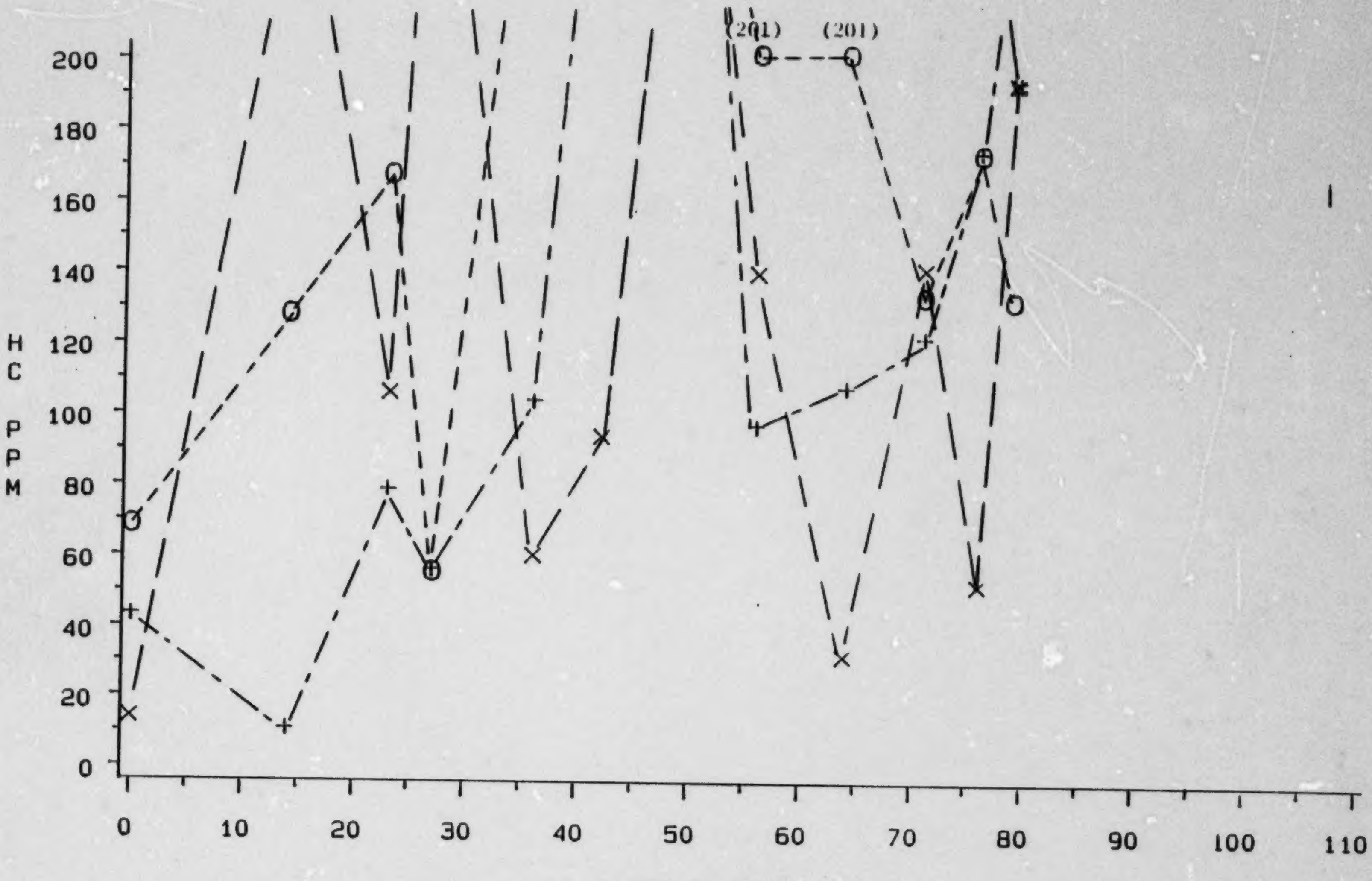


FIGURE G-12. VEHICLE 12 - 1984 CHEVROLET SUBURBAN, HC-IDLE VS TIME



NOTE: 20 OBS WERE OUT OF RANGE, SEE FIGURE H-3

FIGURE G-13. VEHICLE 13 - 1985 FORD RANGER, HC-IDLE VS TIME

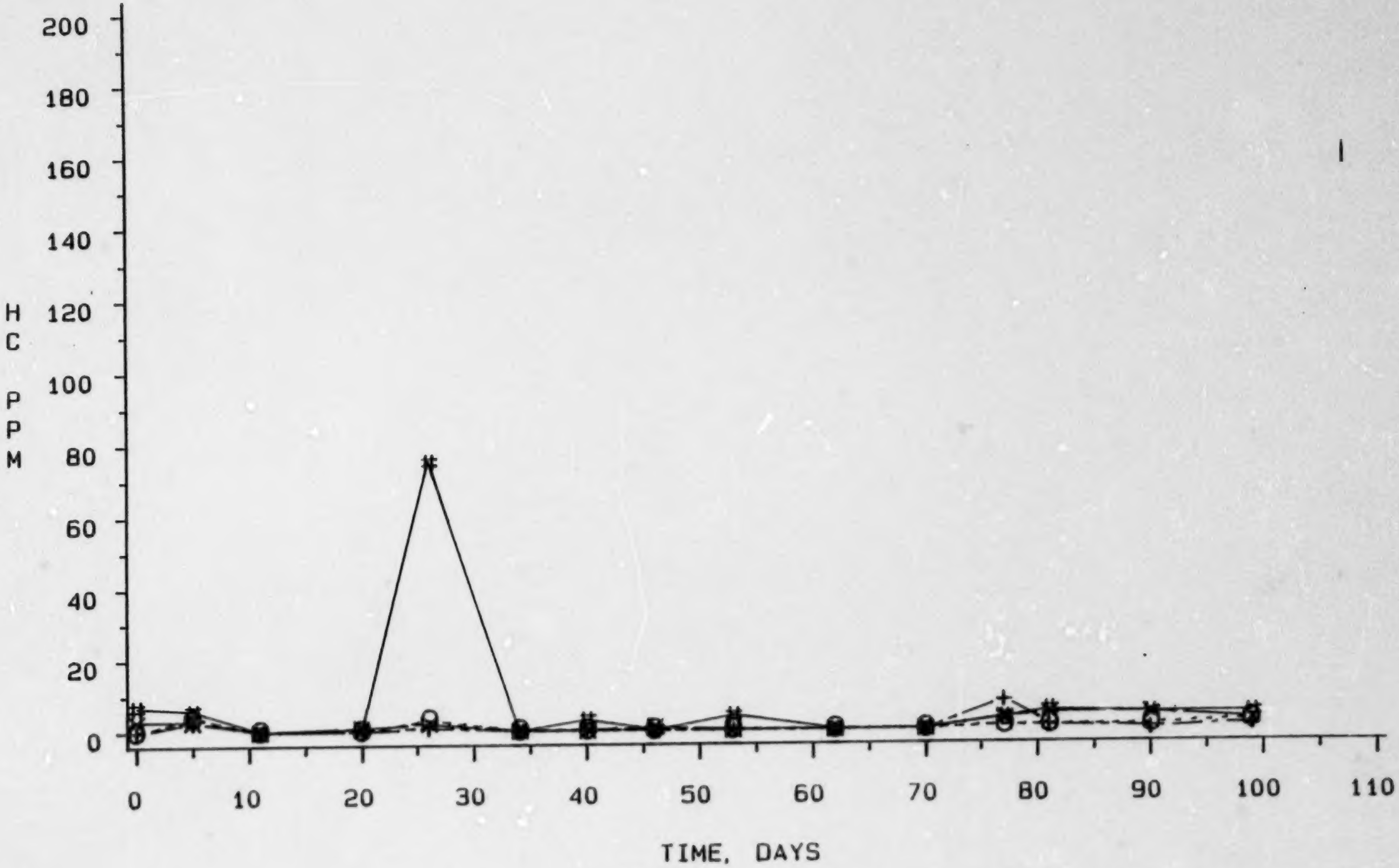


FIGURE G-14. VEHICLE 14 - 1986 OLDSMOBILE CUTLASS SUPREME, HC-IDLE VS TIME

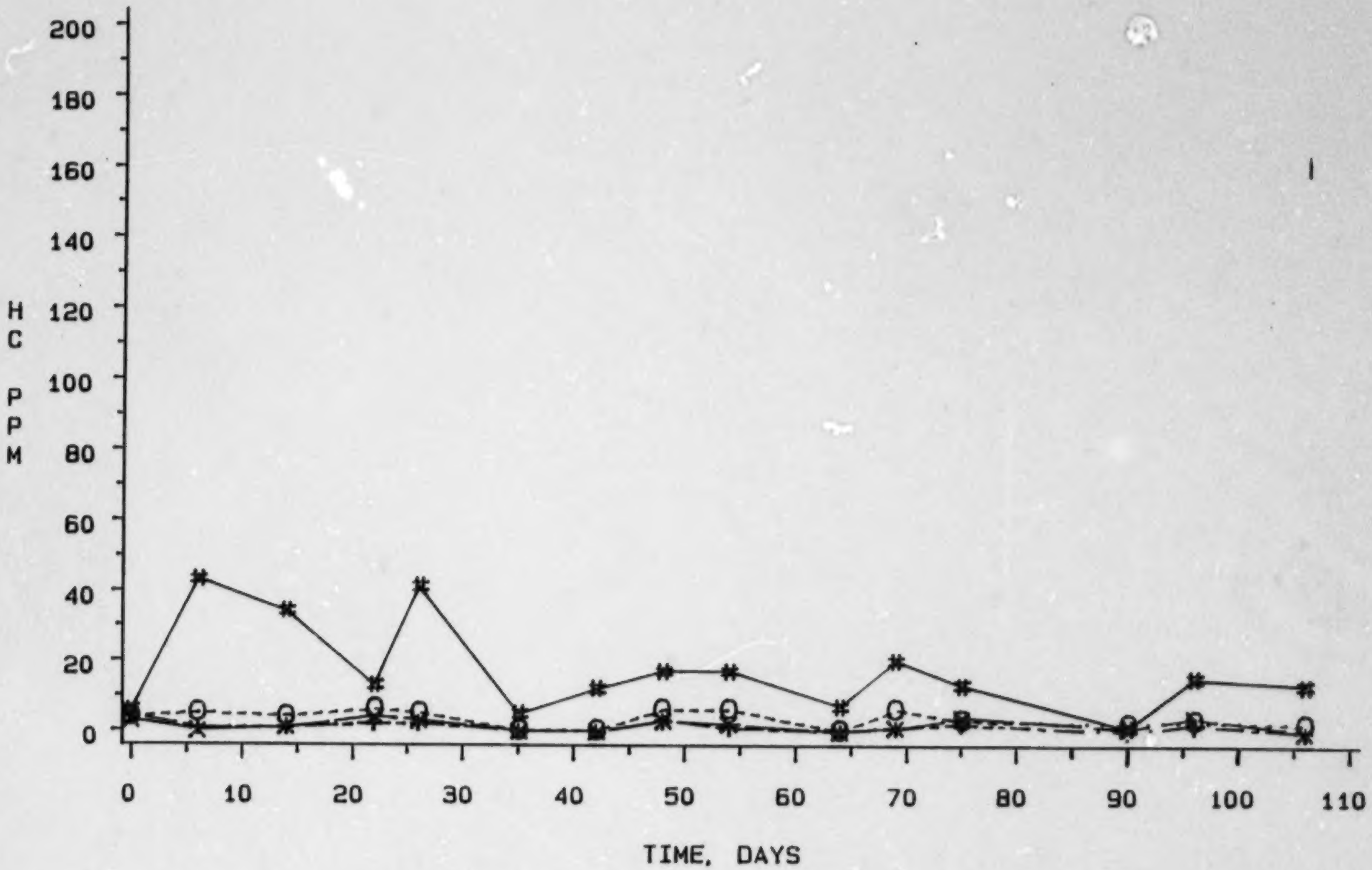


FIGURE G-15. VEHICLE 15 - 1987 HYUNDAI EXCEL GS, HC-IDLE VS TIME

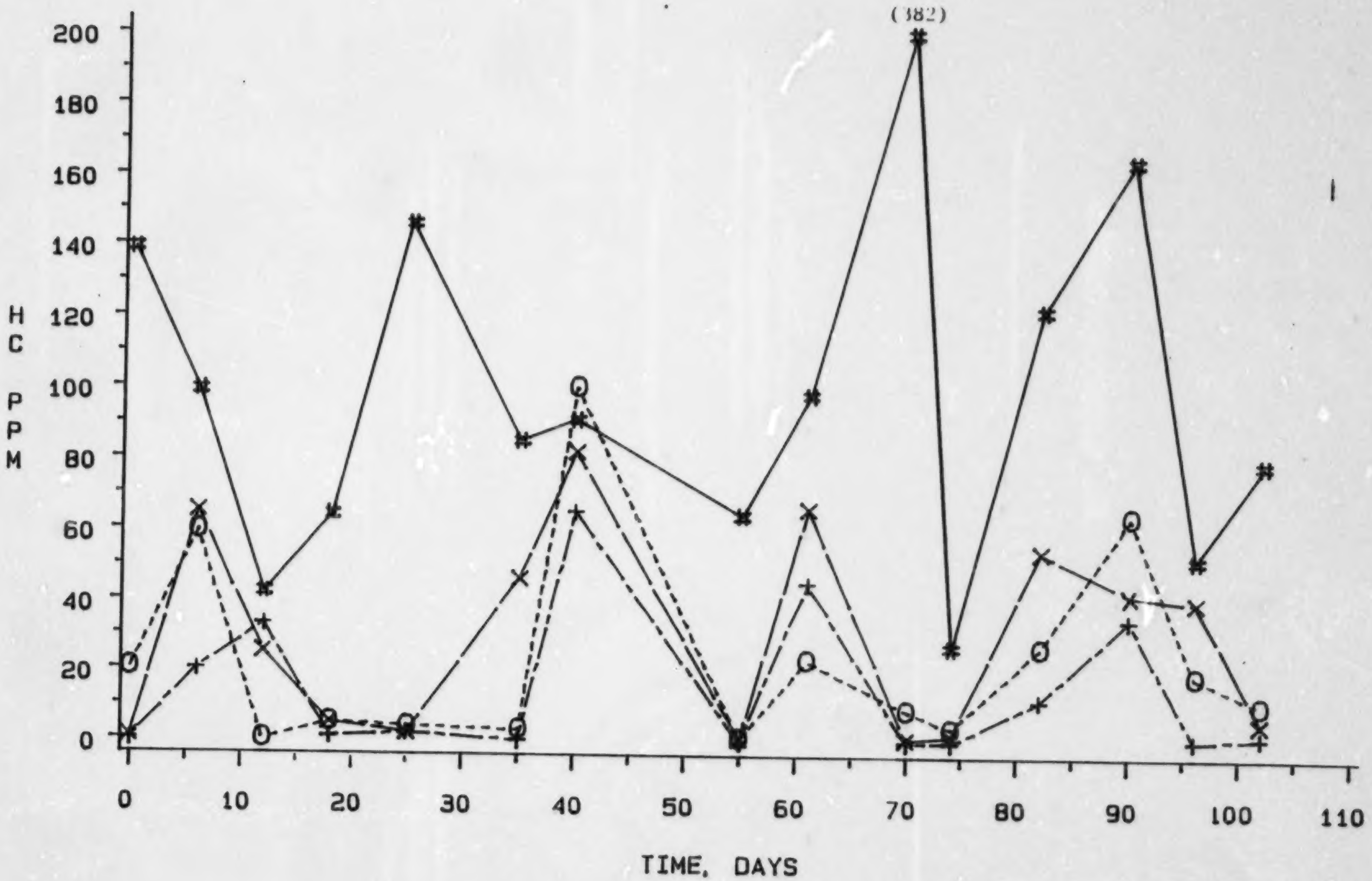
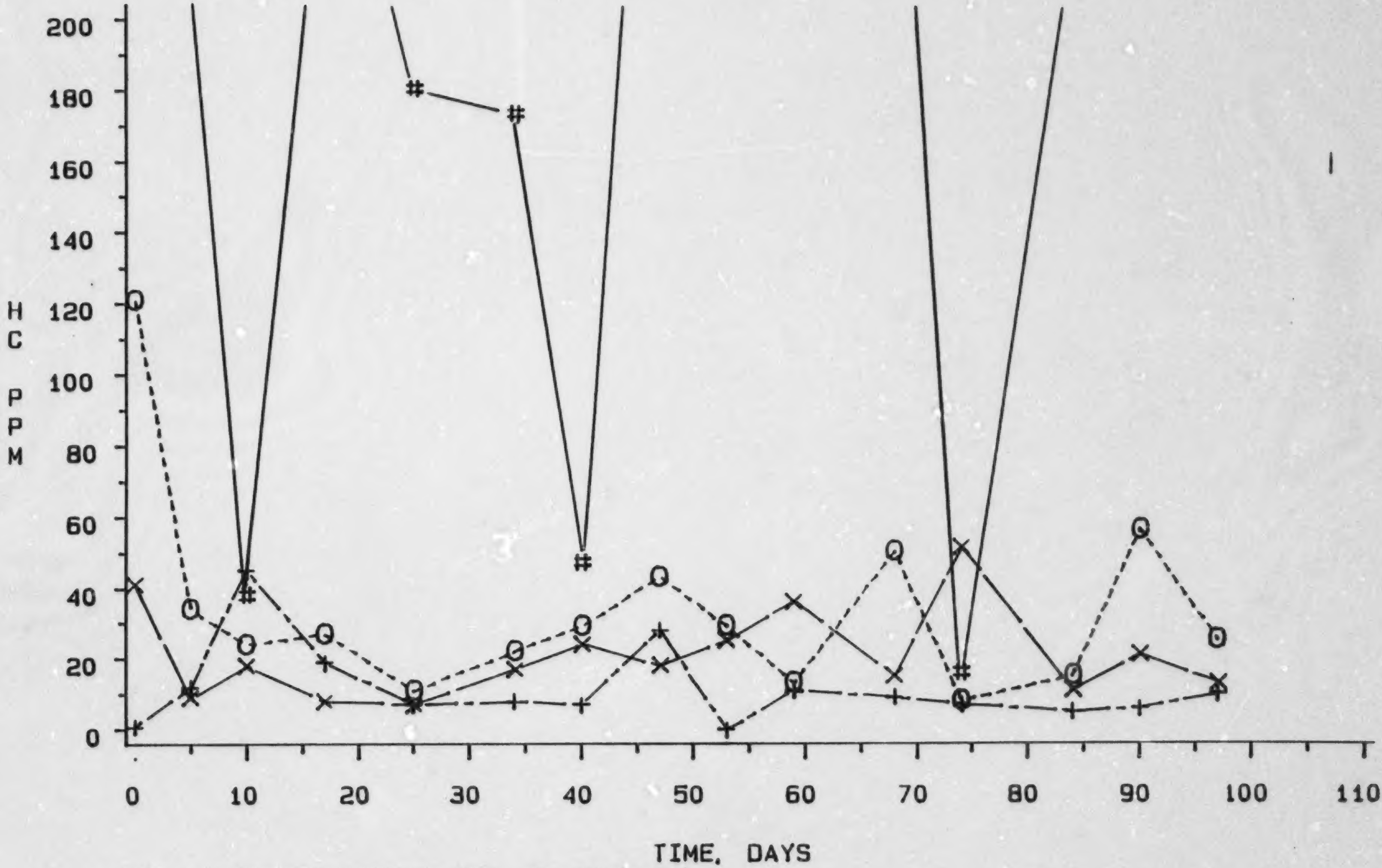


FIGURE G-16. VEHICLE 16 - 1986 FORD THUNDERBIRD, HC-IDLE VS TIME



NTOE: 10 OBS WERE OUT OF RANGE, SEE FIGURE H-4

FIGURE G-17. VEHICLE 17 - 1984 FORD E-150, HC-IDLE VS TIME

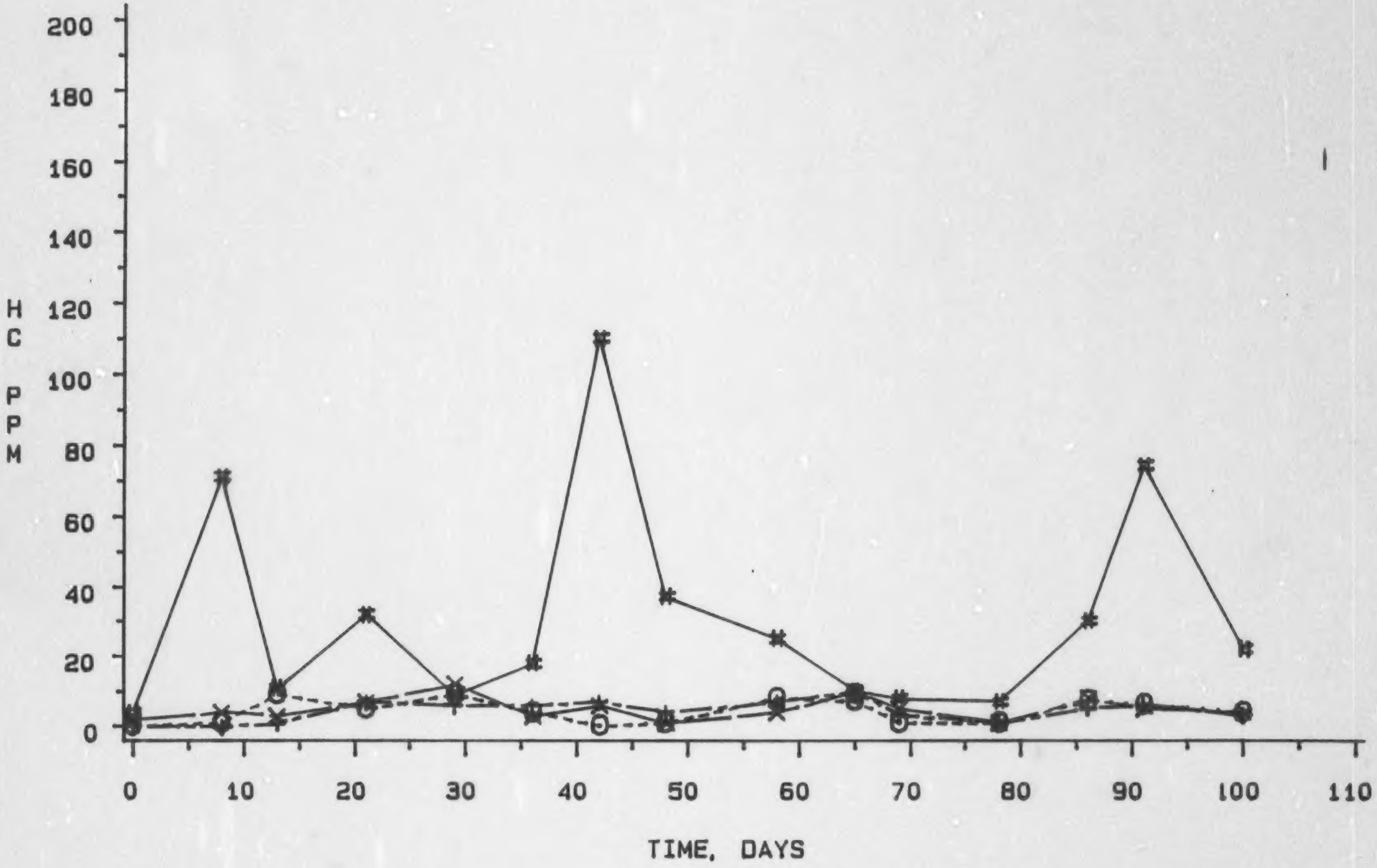
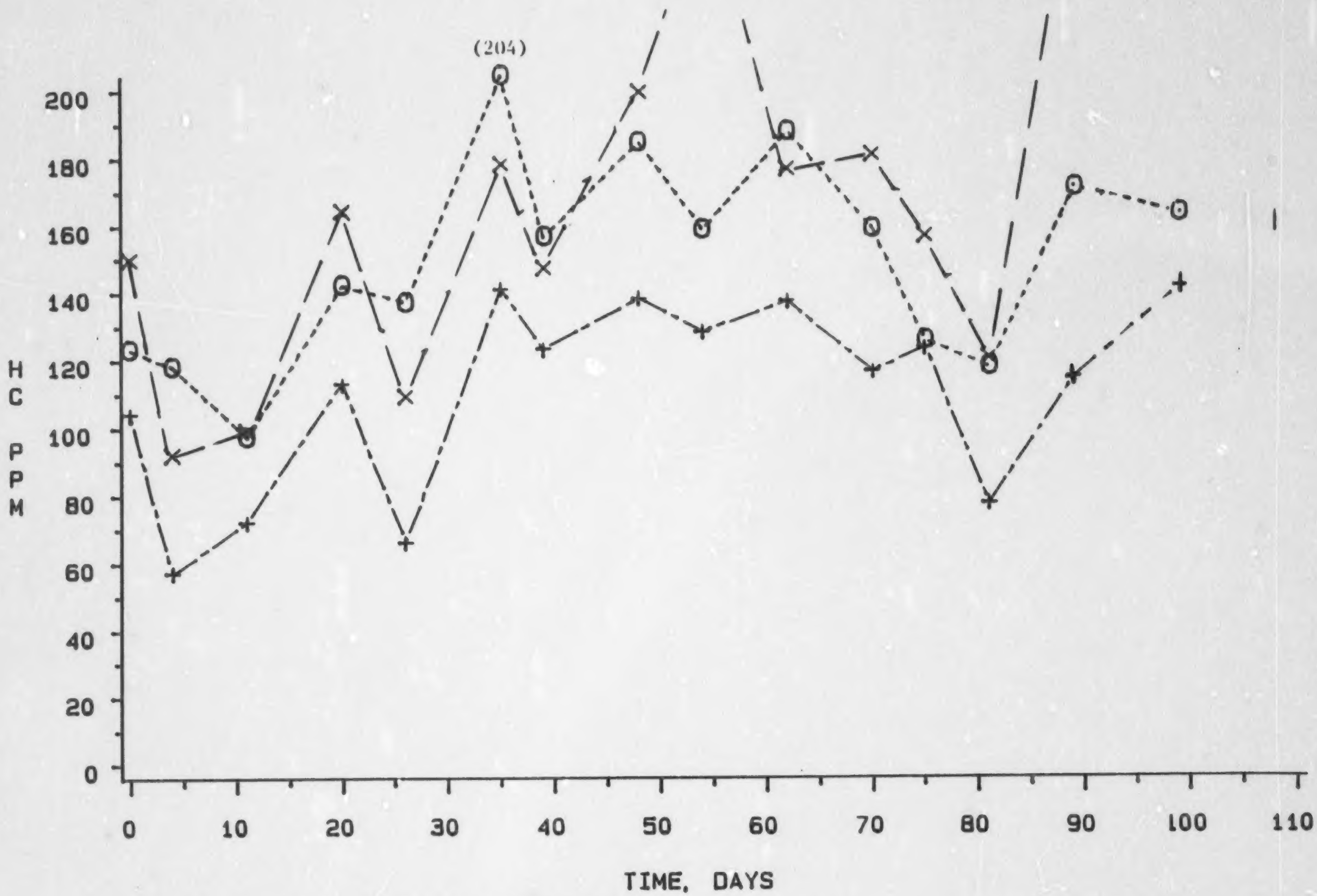


FIGURE G-18. VEHICLE 18 - 1984 CHEVROLET CAPRICE CLASSIC, HC-IDLE VS TIME



NOTE: 13 OBS WERE OUT OF RANGE, SEE FIGURE H-5

FIGURE G-19. VEHICLE 19 - 1985 CHEVROLET CAVALIER, HC-IDLE VS TIME

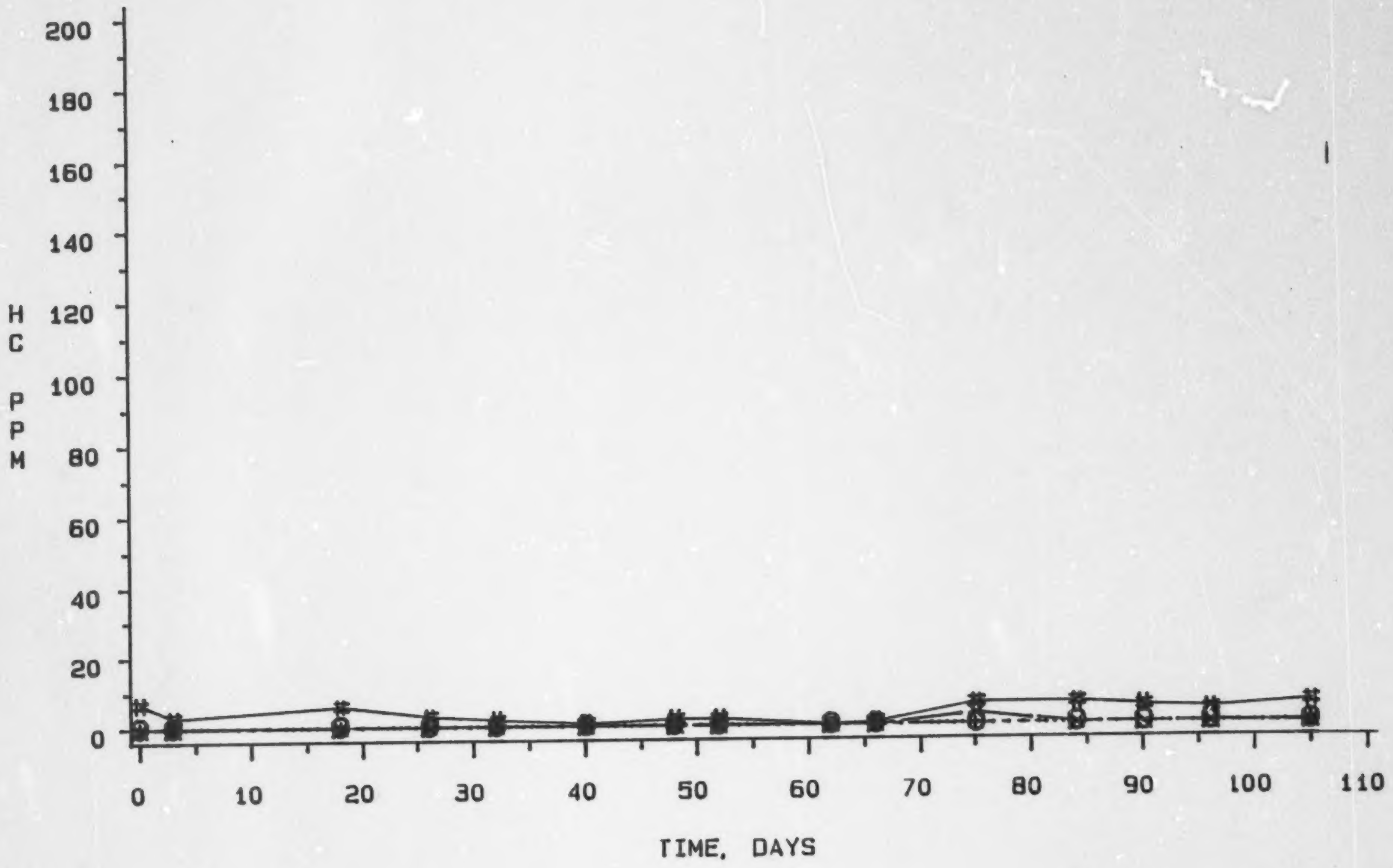


FIGURE G-20. VEHICLE 20 - 1987 BUICK LESABRE, HC-IDLE VS TIME

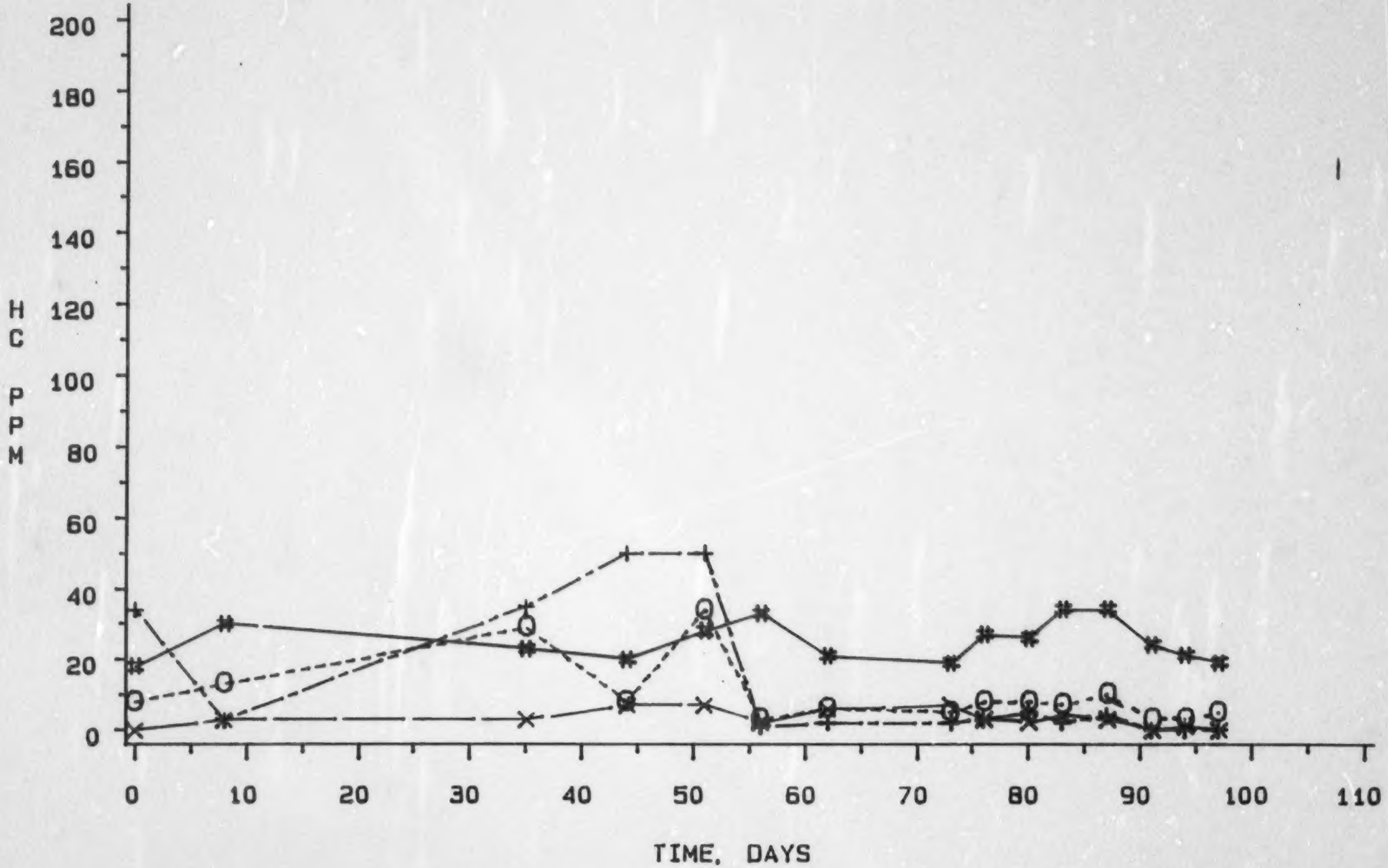
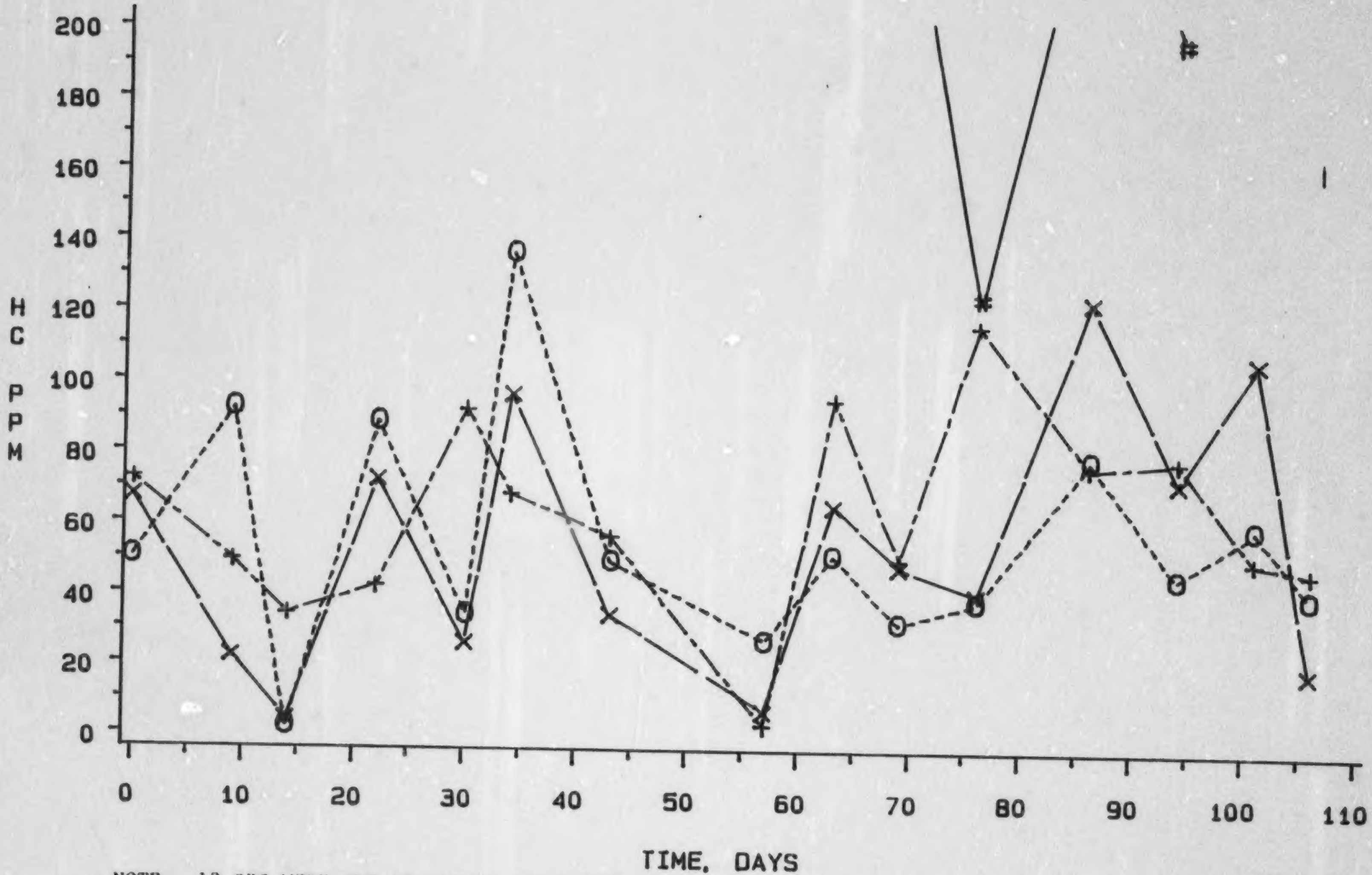
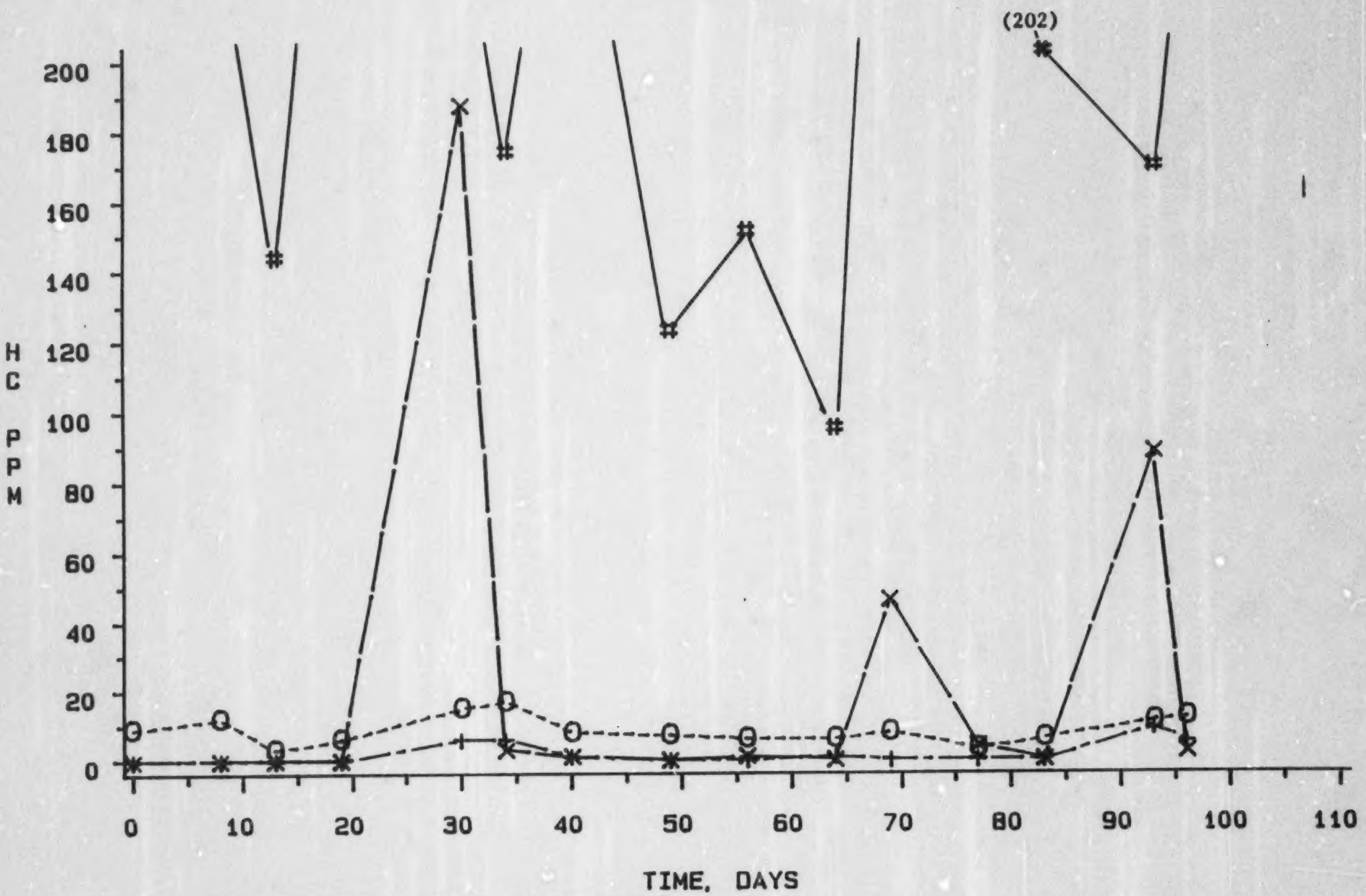


FIGURE G-21. VEHICLE 21 - 1982 VOLKSWAGEN SCIRROCO, HC-IDLE VS TIME



NOTE: 13 OBS WERE OUT OF RANGE, SEE FIGURE H-6

FIGURE G-22. VEHICLE 22 - 1987 CHEVROLET ASTRO, HC-IDLE VS TIME



NOTE: 8 OBS WERE OUT OF RANGE, SEE FIGURE H-7

FIGURE G-23. VEHICLE 23 - 1987 NISSAN PULSAR, HC-IDLE VS TIME

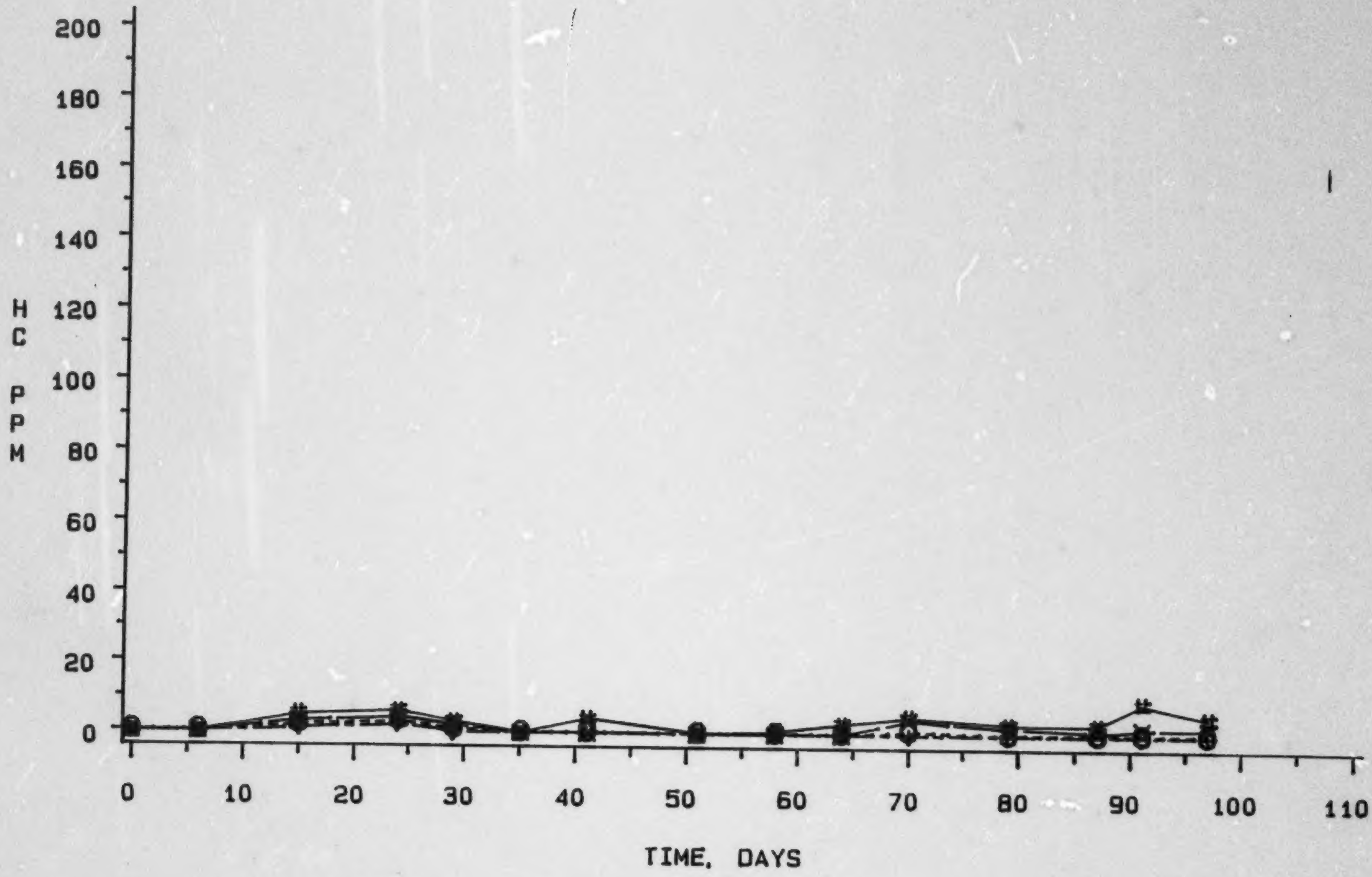


FIGURE G-24. VEHICLE 24 - 1986 BUICK CENTURY, HC-IDLE VS TIME

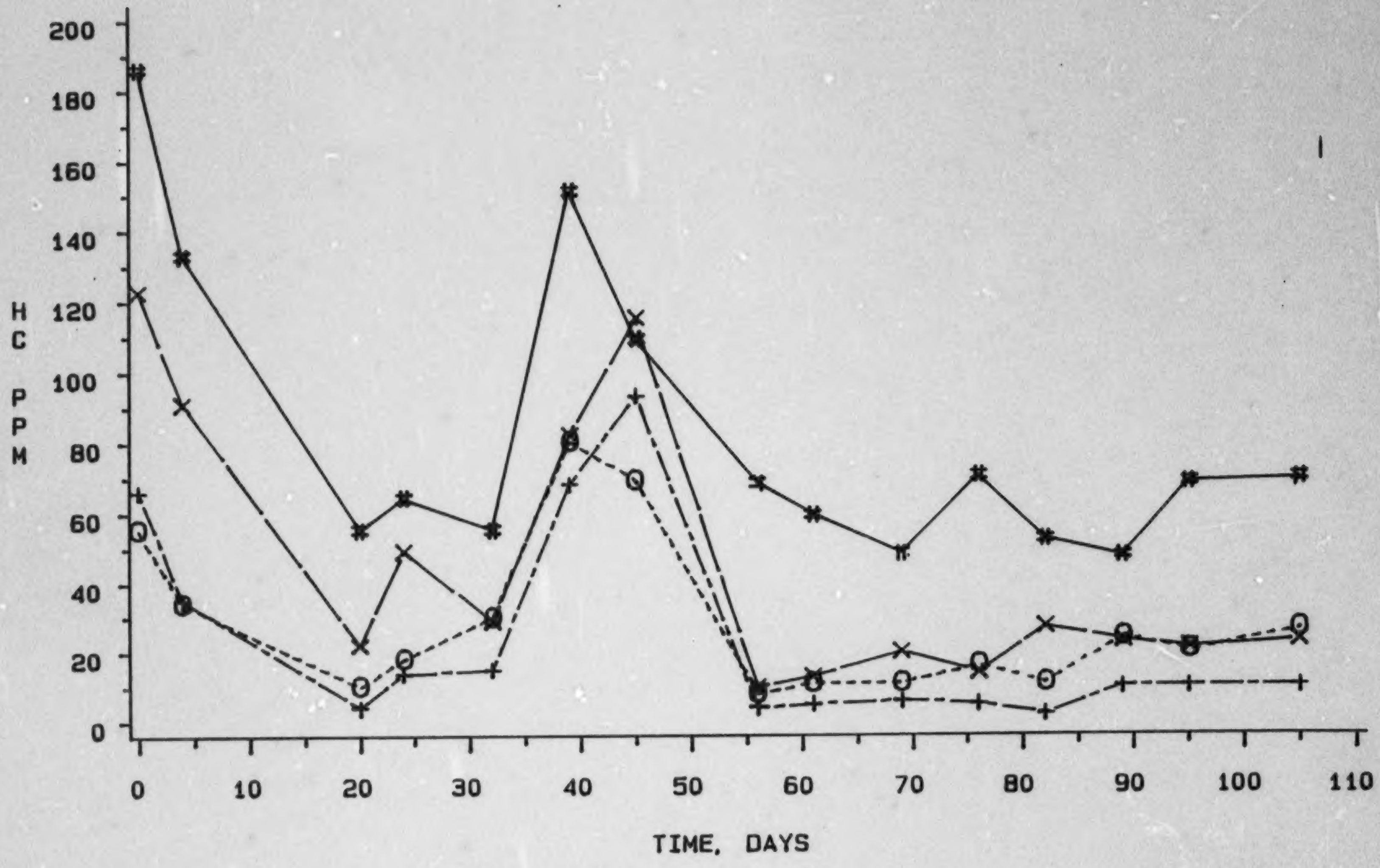


FIGURE G-25. VEHICLE 25 - 1982 VOLVO 240 DL, HC-IDLE VS TIME

APPENDIX H

REPLOTS OF HC-IDLE EMISSIONS VERSUS TIME
0-400 or 0-800 PPM SCALE

Figure H-	Vehicle No.	Vehicle Make and Model
1	01	Mercury Zephyr
2	10	BMW 318i
3	13	Ford Ranger
4	17	Ford E-150 Van
5	19	Chevrolet Cavalier
6	22	Chevrolet Astro Van
7	23	Nissan Pulsar

Legend for Plots

x - Before 2500 rpm conditioning - am
+ - After 2500 rpm conditioning - am
# - Before 2500 rpm conditioning - pm
0 - After 2500 rpm conditioning - pm

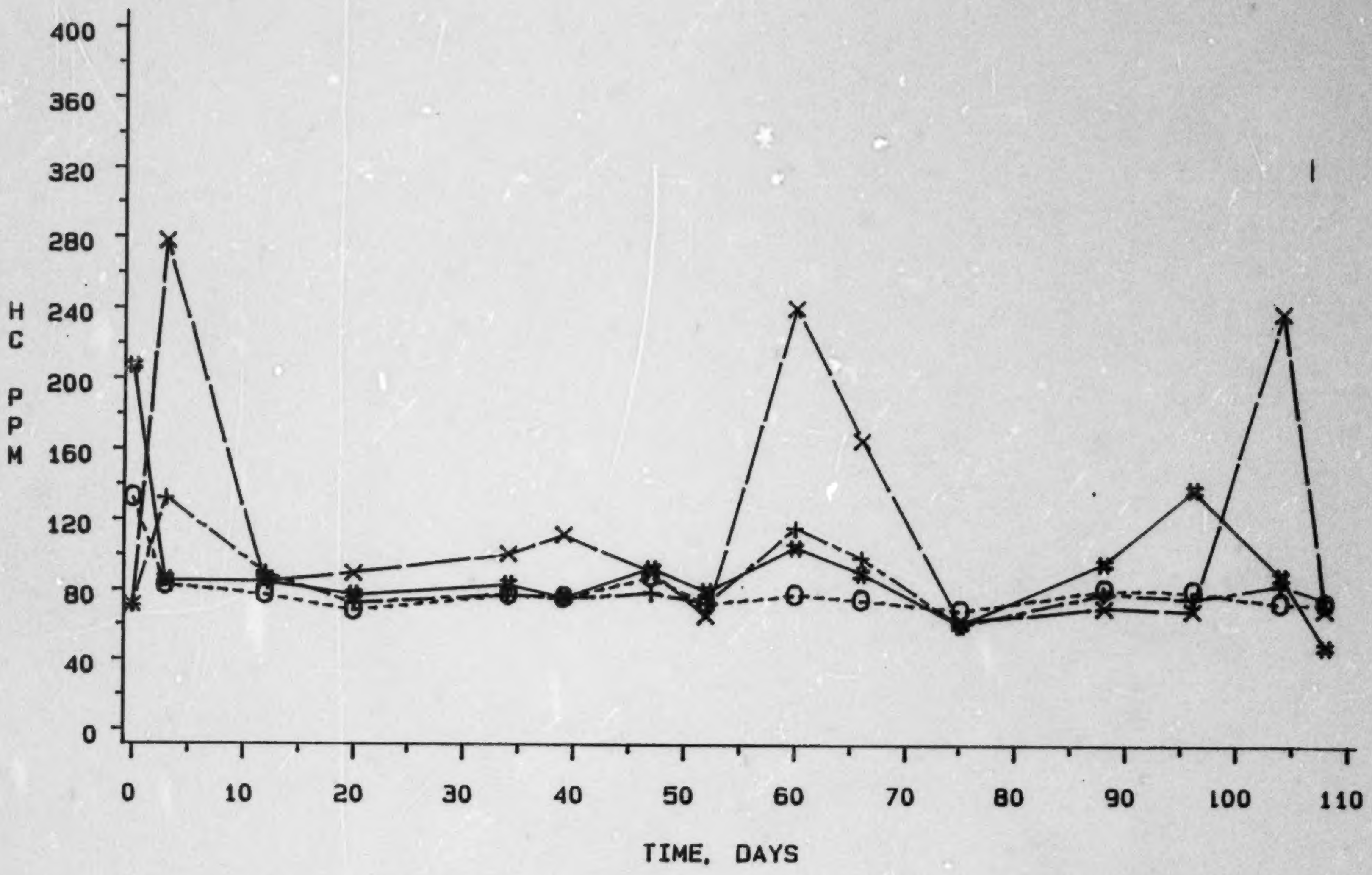


FIGURE H-1. VEHICLE 1 - 1982 MERCURY ZEPHYR, HC-IDLE VS TIME

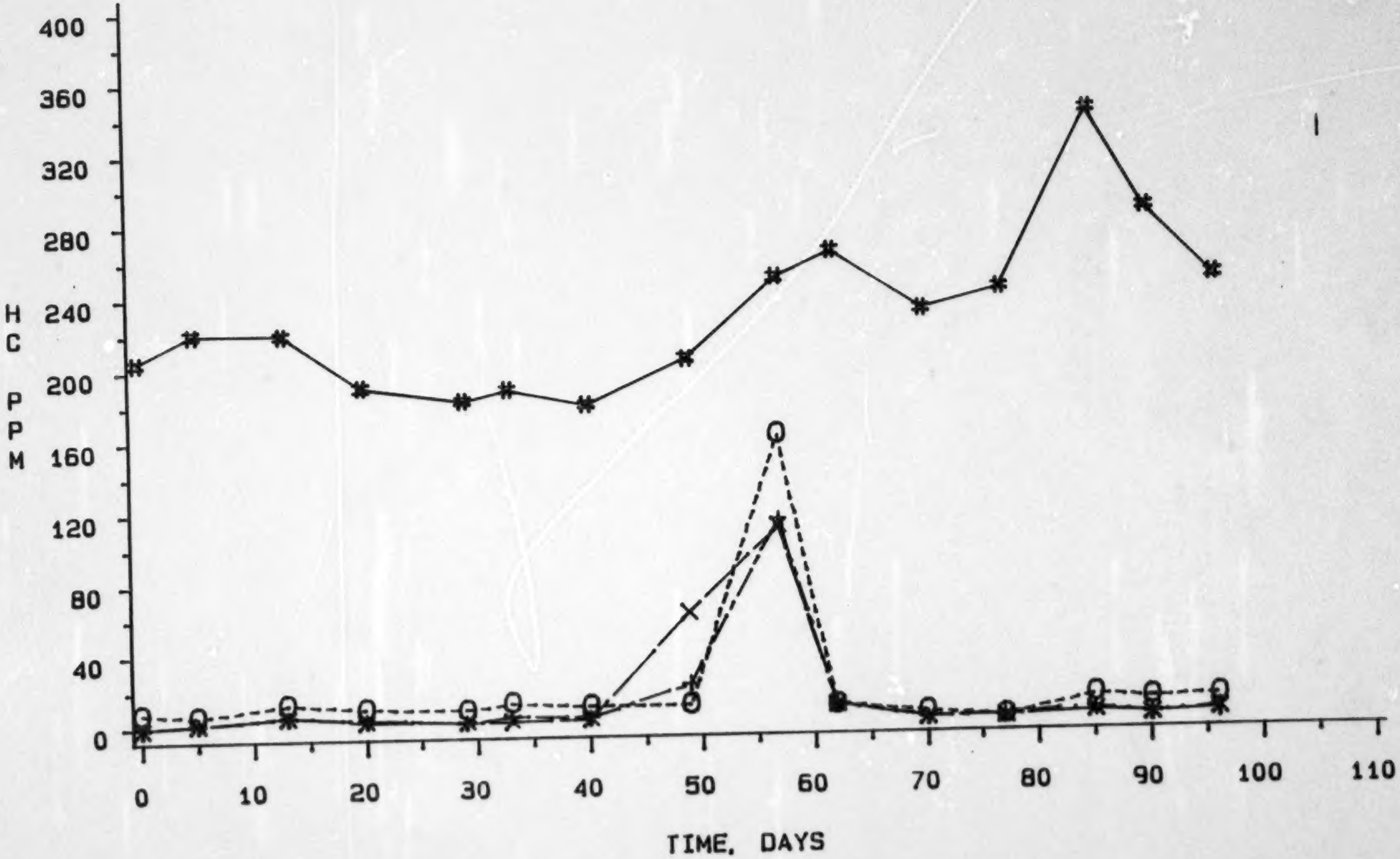


FIGURE H-2. VEHICLE 10 - 1985 BMW 318i, HC-IDLE VS TIME

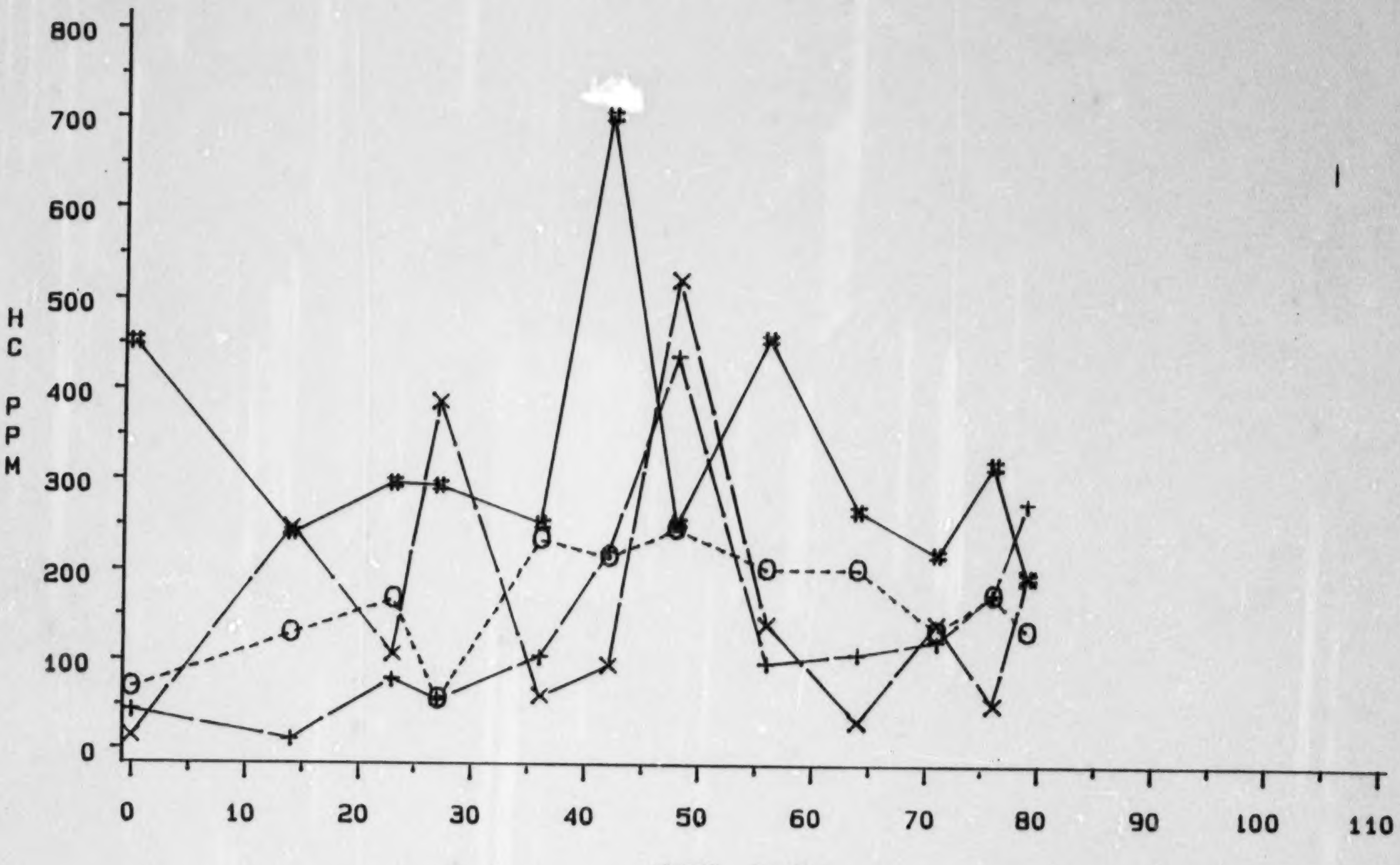


FIGURE H-3. VEHICLE 13 - 1985 FORD RANGER, HC-IDLE VS TIME

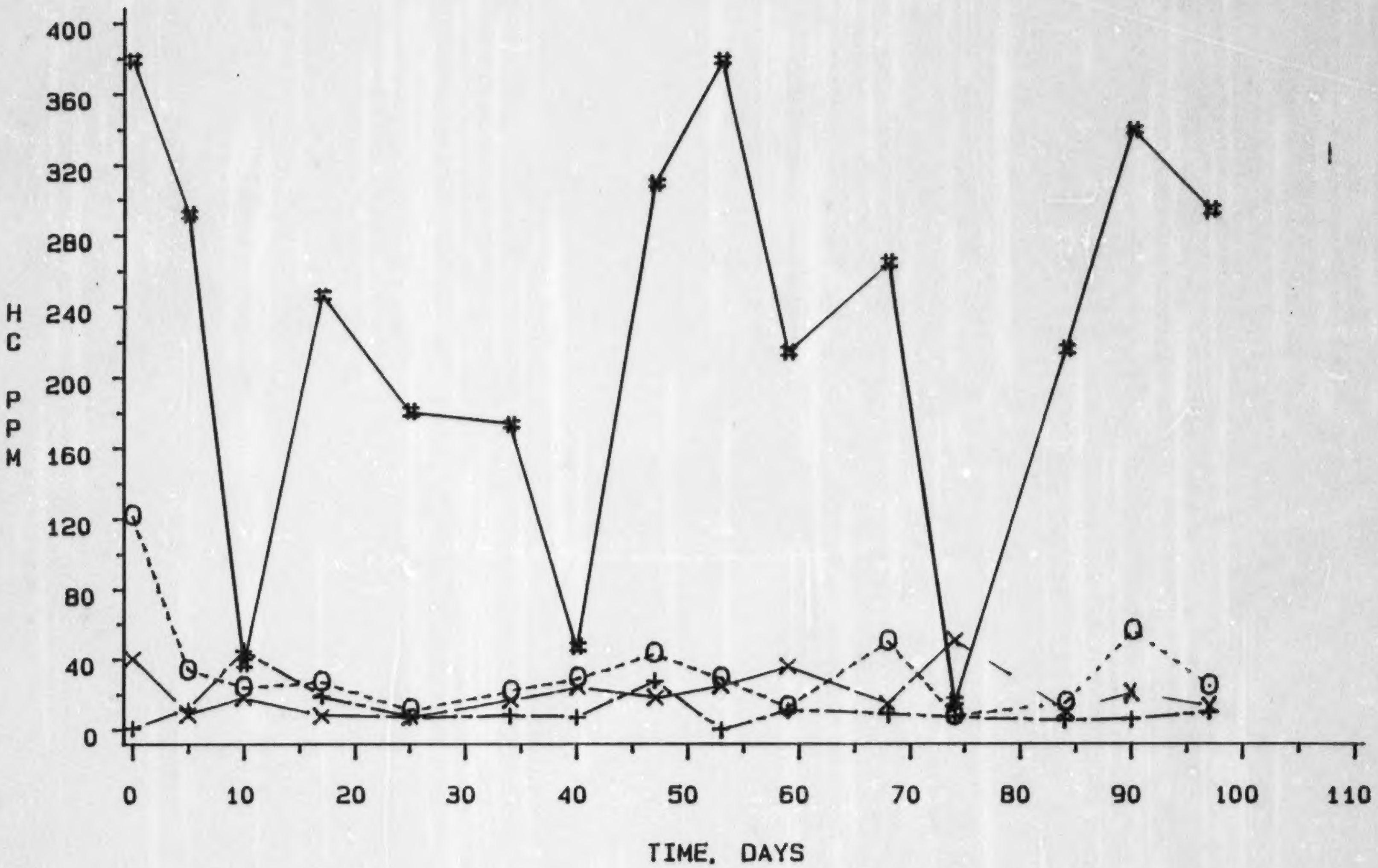


FIGURE H-4. VEHICLE 17 - 1984 FORD E-150, HC-IDLE VS TIME

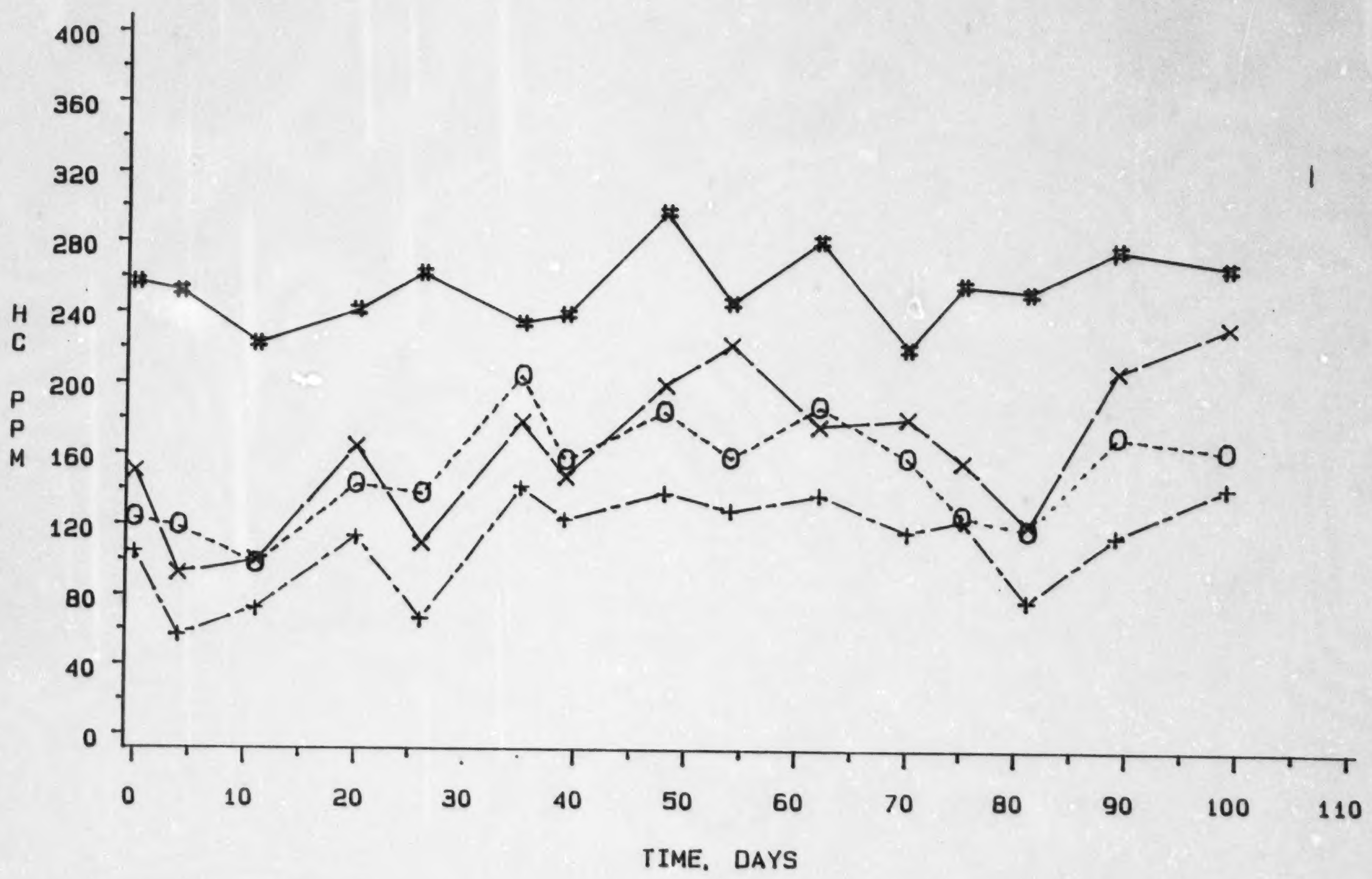


FIGURE H-5. VEHICLE 19 - 1985 CHEVROLET CAVALIER, HC-IDLE VS TIME

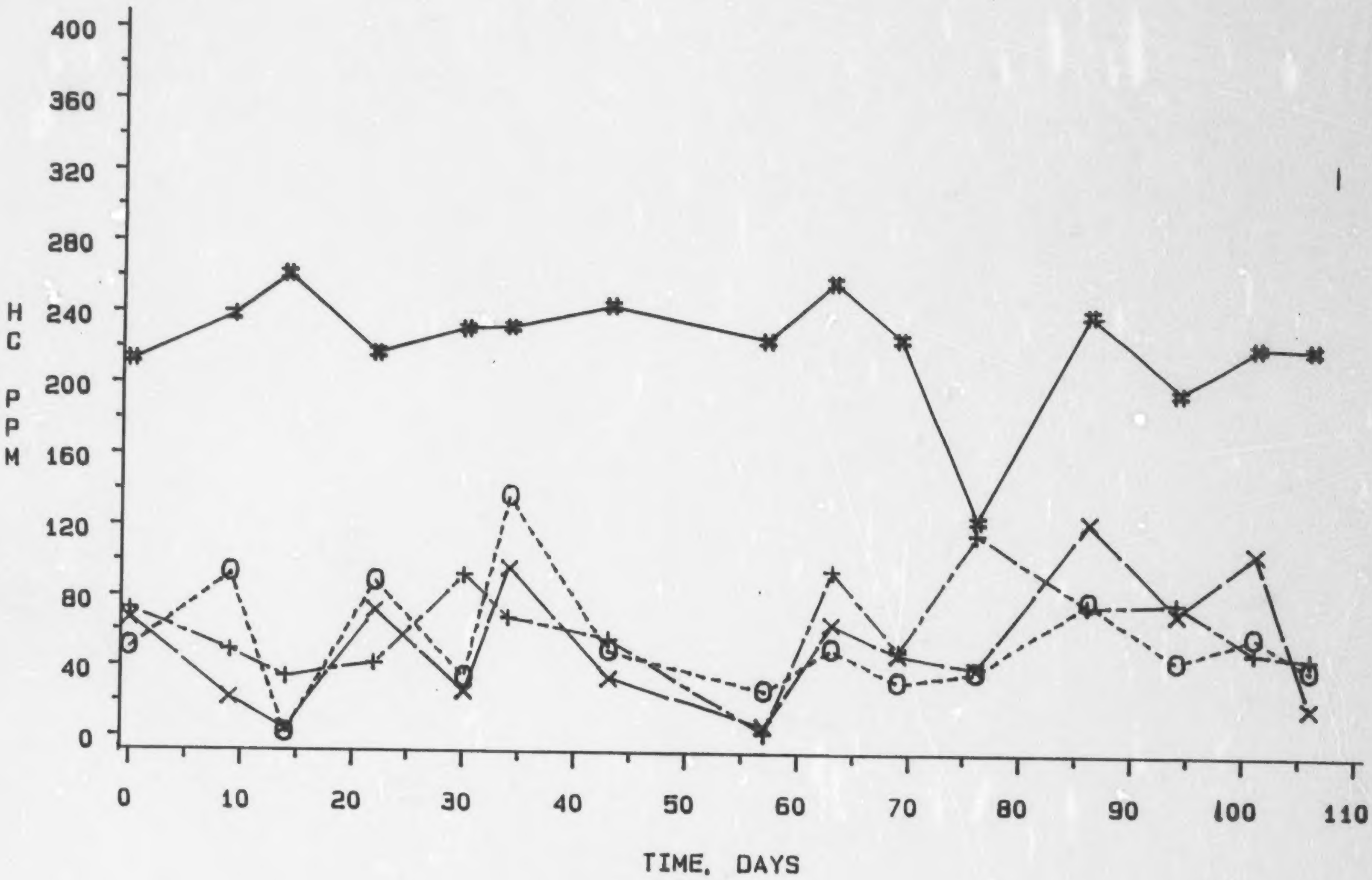


FIGURE H-6. VEHICLE 22 - 1987 CHEVROLET ASTRO, HC-IDLE VS TIME

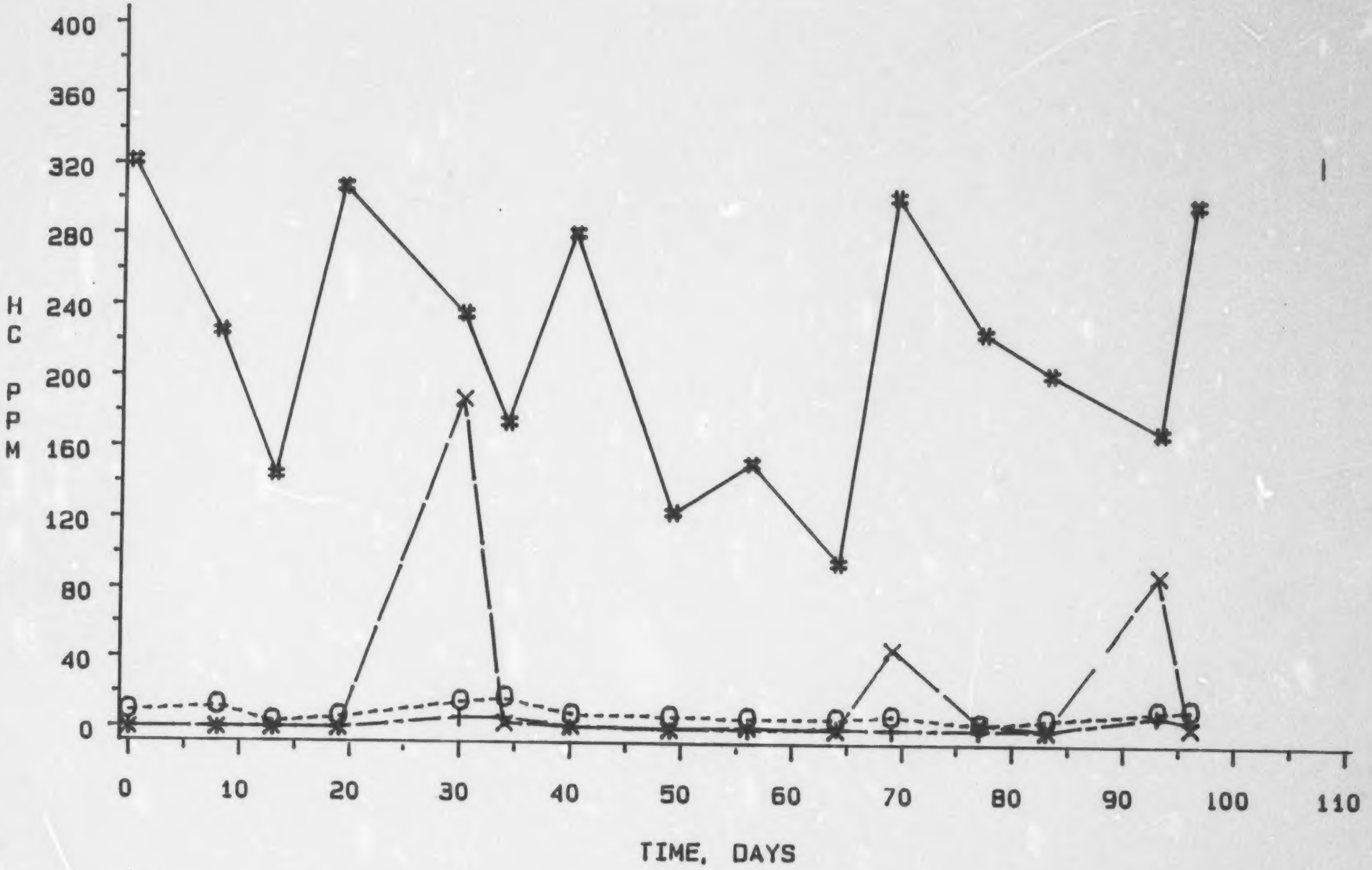


FIGURE H-7. VEHICLE 23 - 1987 NISSAN PULSAR, HC-IDLE VS TIME

APPENDIX I

PLOTS OF CO-2500 RPM EMISSIONS VERSUS TIME
0-2 PERCENT SCALE

Figure I-	Vehicle No.	Vehicle Make and Model
1	01	Mercury Zephyr
2	02	Dodge Ramcharger
3	03	Oldsmobile Delta 88
4	04	Chevrolet Silverado
5	05	Honda Civic
6	06	Honda Accord
7	07	Jeep Cherokee
8	08	Peugeot 505
9	09	Volkswagen Golf
10	10	BMW 318i
11	11	Nissan Pulsar
12	12	Chevrolet Suburban
13	13	Ford Ranger
14	14	Oldsmobile Cutlass Supreme
15	15	Hyundai Excel GLS
16	16	Ford Tunderbird
17	17	Ford E-150 Van
18	18	Chevrolet Caprice Classic
19	19	Chevrolet Cavalier
20	20	Buick LeSabre
21	21	Volkswagen Scirocco
22	22	Chevrolet Astro Van
23	23	Nissan Pulsar
24	24	Buick Century
25	25	Volvo 240 DL

Legend for Plots

x - Before 2500 rpm conditioning - am
+ - After 2500 rpm conditioning - am
# - Before 2500 rpm conditioning - pm
0 - After 2500 rpm conditioning - pm

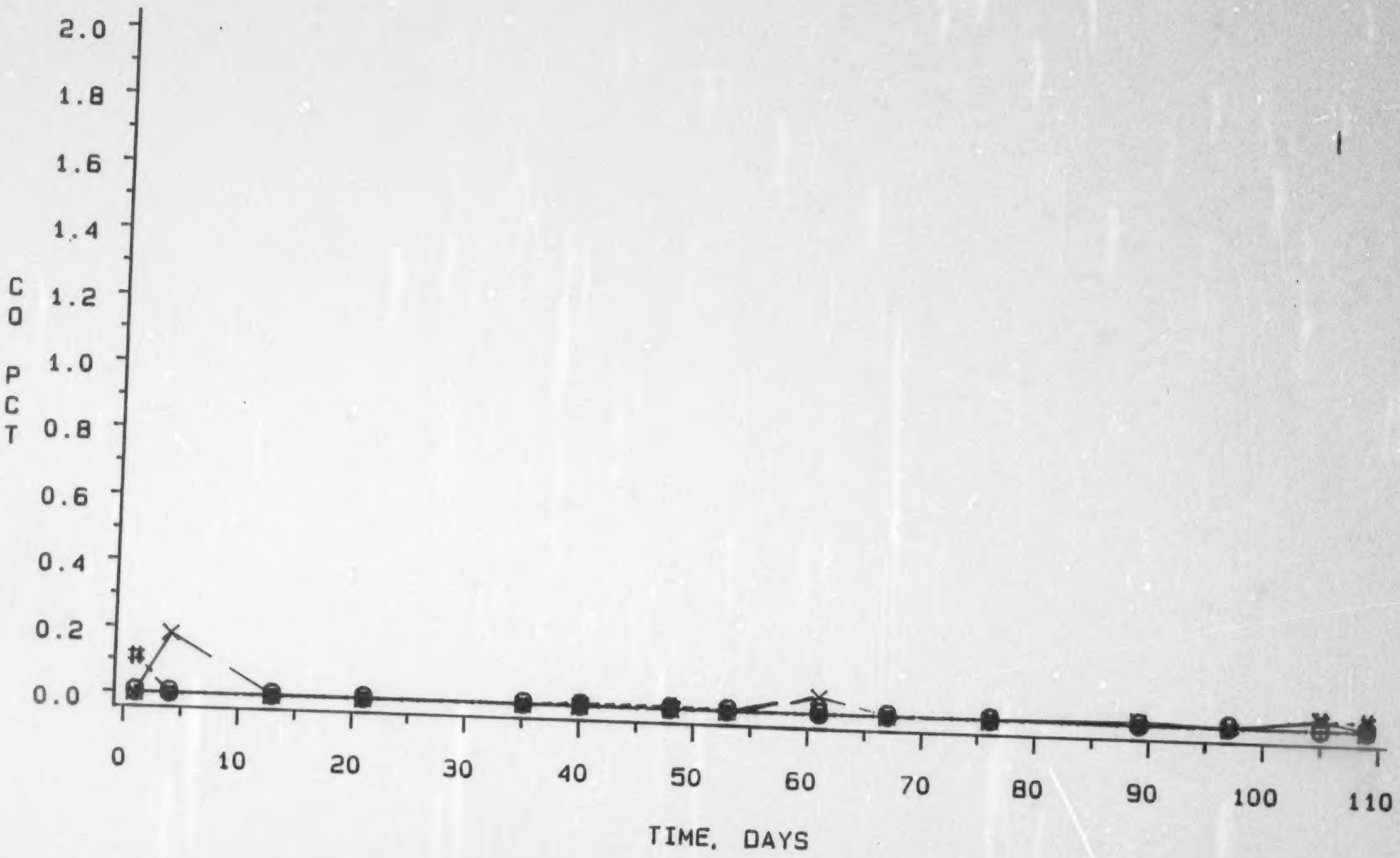


FIGURE I-1. VEHICLE 1 - 1982 MERCURY ZEPHYR, CO-2500 RPM VS TIME

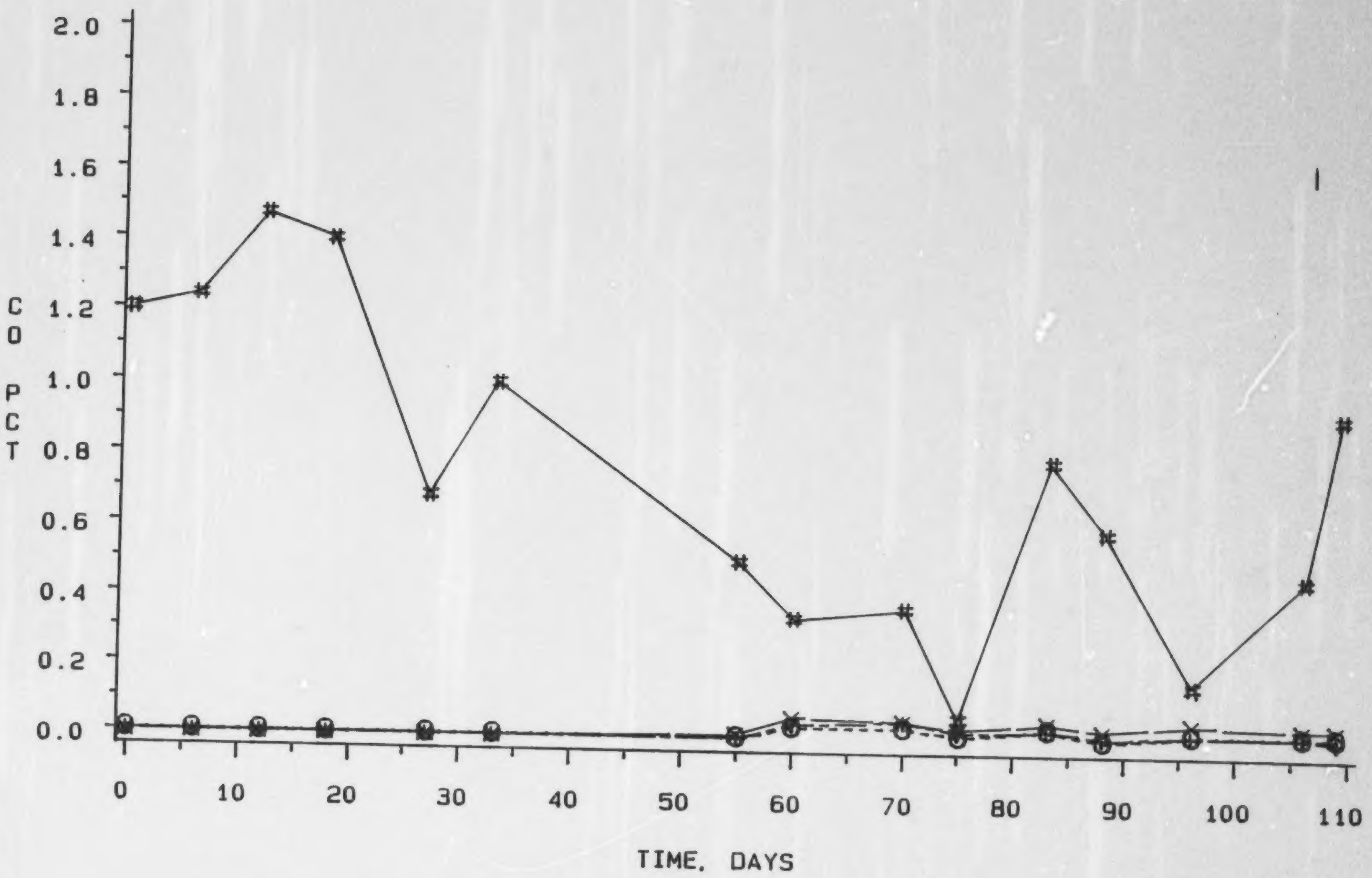
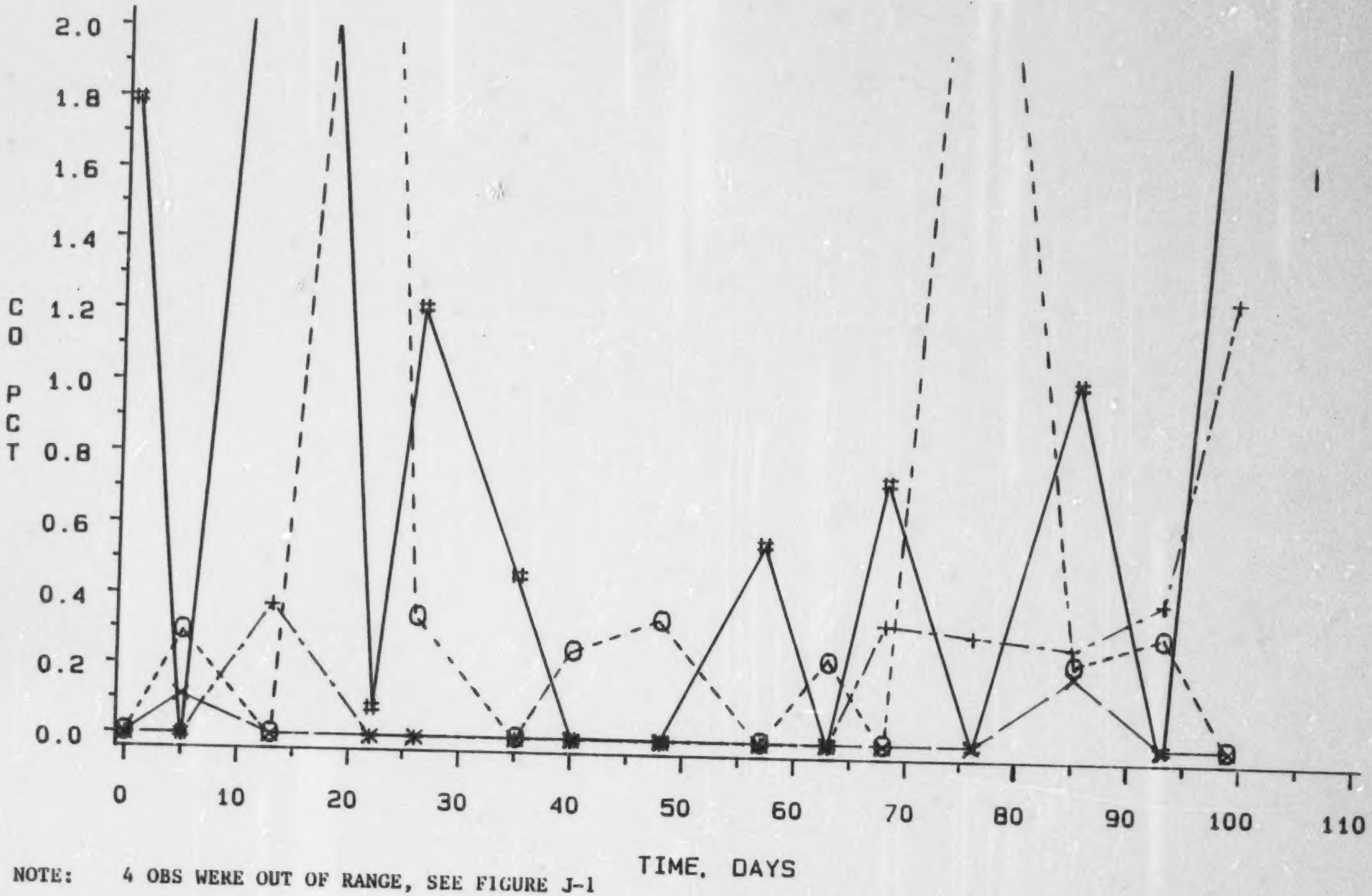


FIGURE I-2. VEHICLE 2 - 1984 DODGE RAMCHARGER, CO-2500 RPM VS TIME



NOTE: 4 OBS WERE OUT OF RANGE, SEE FIGURE J-1

FIGURE I-3. VEHICLE 3 - 1984 OLDSMOBILE DELTA 88, CO-2500 RPM VS TIME

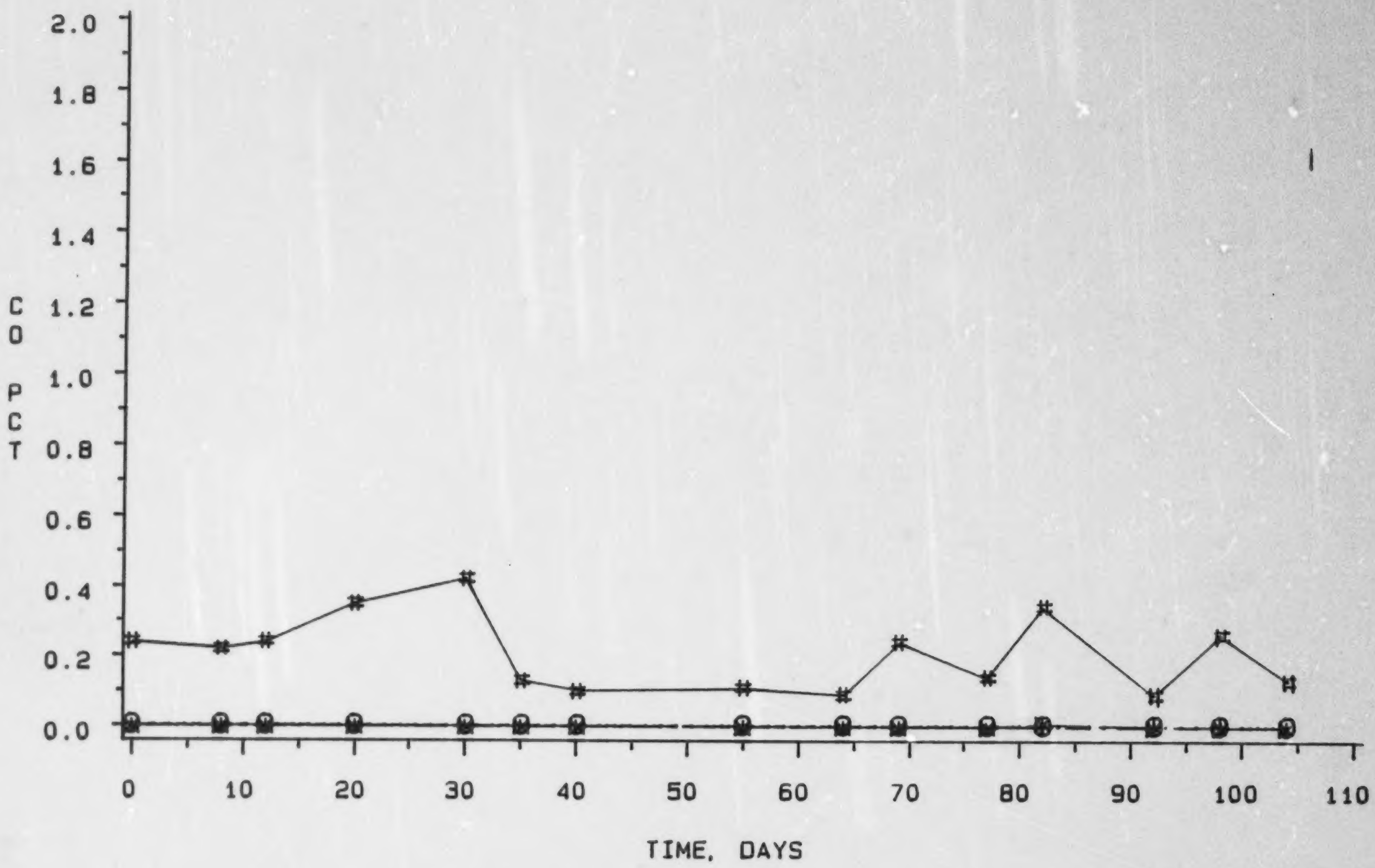
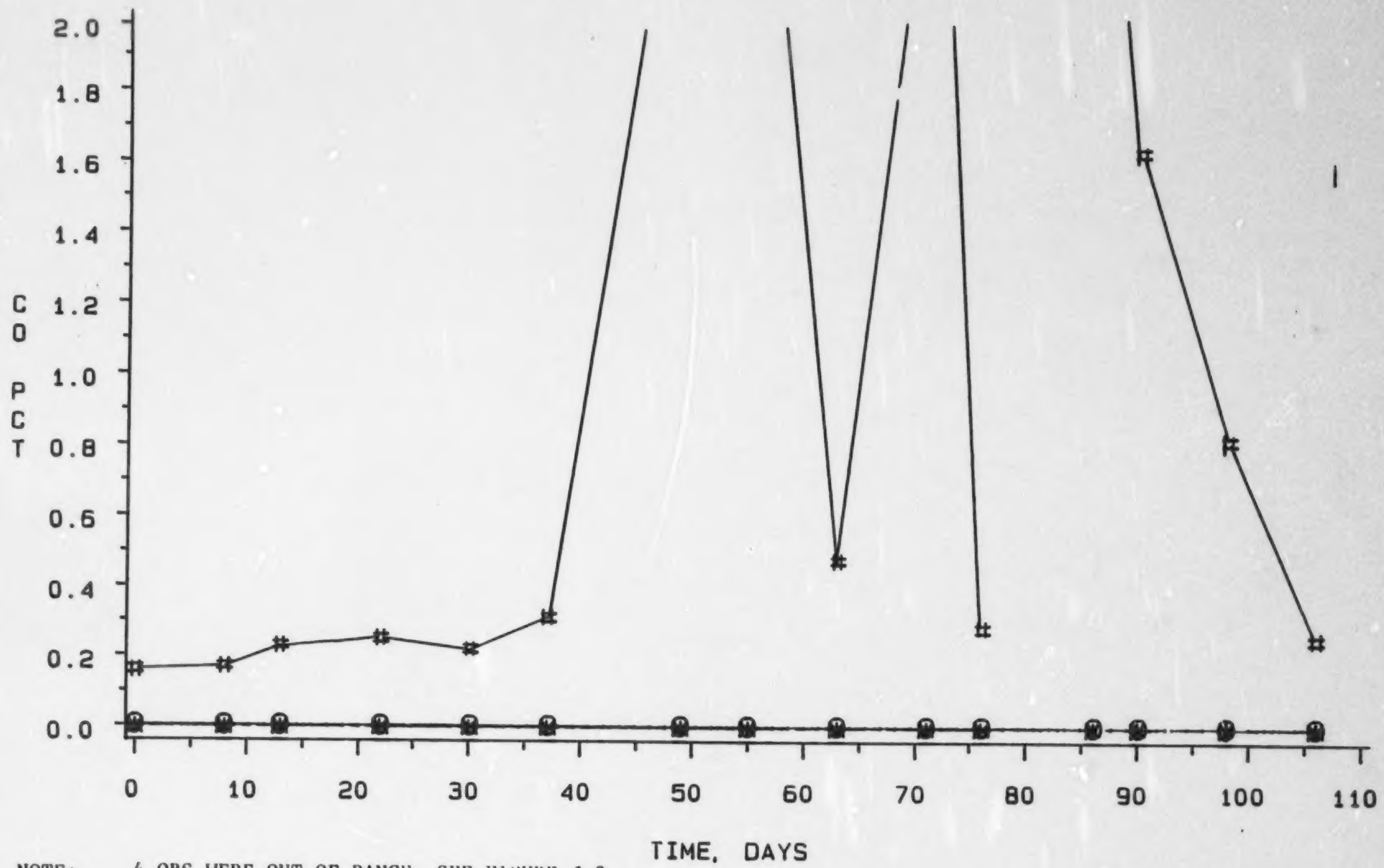
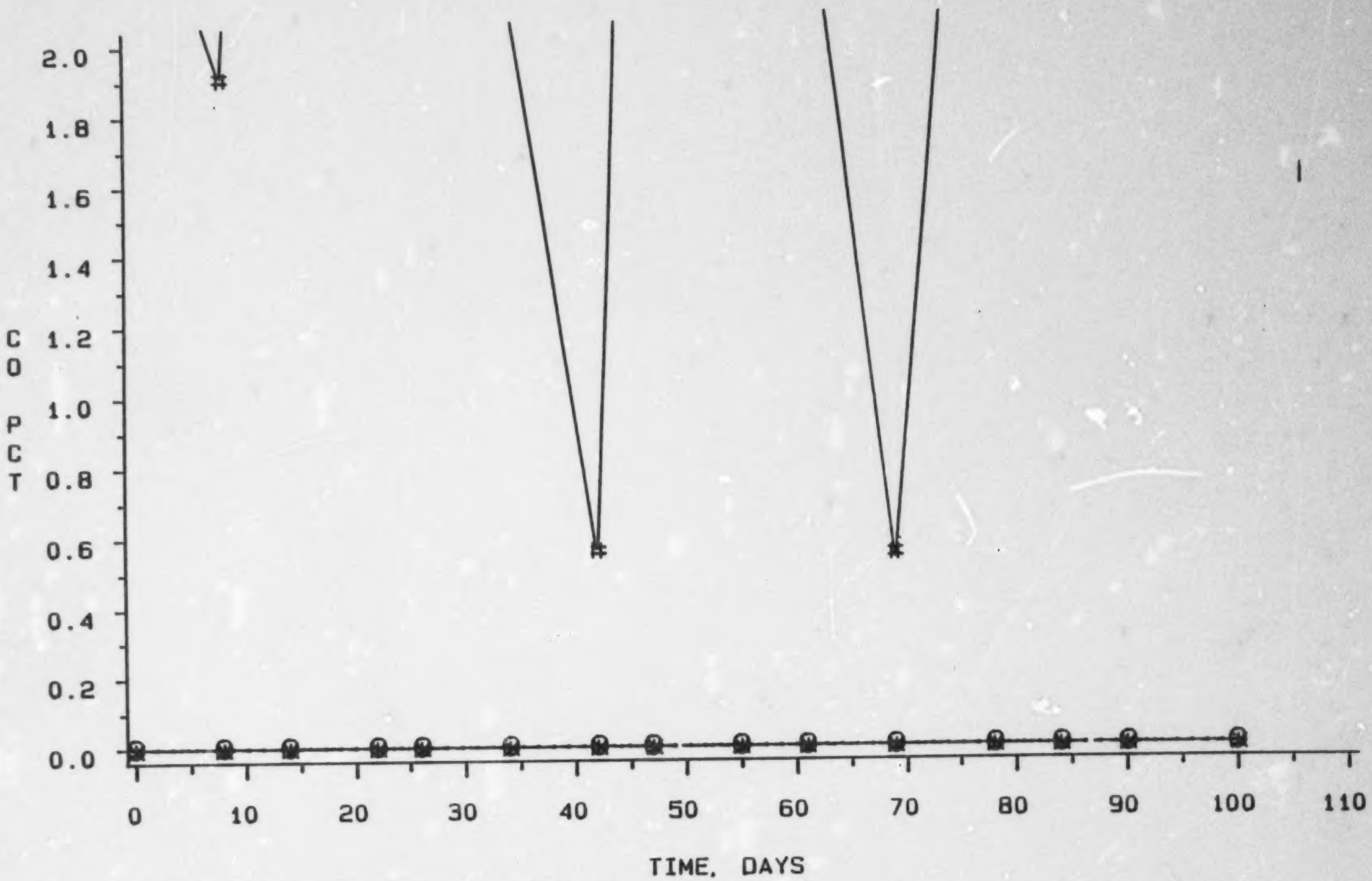


FIGURE I-4. VEHICLE 4 - 1984 CHEVROLET SILVERADO, CO-2500 RPM VS TIME



NOTE: 4 OBS WERE OUT OF RANGE, SEE FIGURE J-2

FIGURE I-5. VEHICLE 5 - 1981 HONDA CIVIC, CO-2500 RPM VS TIME



NOTE: 12 OBS WERE OUT OF RANGE, SEE FIGURE J-3

FIGURE I-6. VEHICLE 6 - 1985 HONDA ACCORD, CO-2500 RPM VS TIME

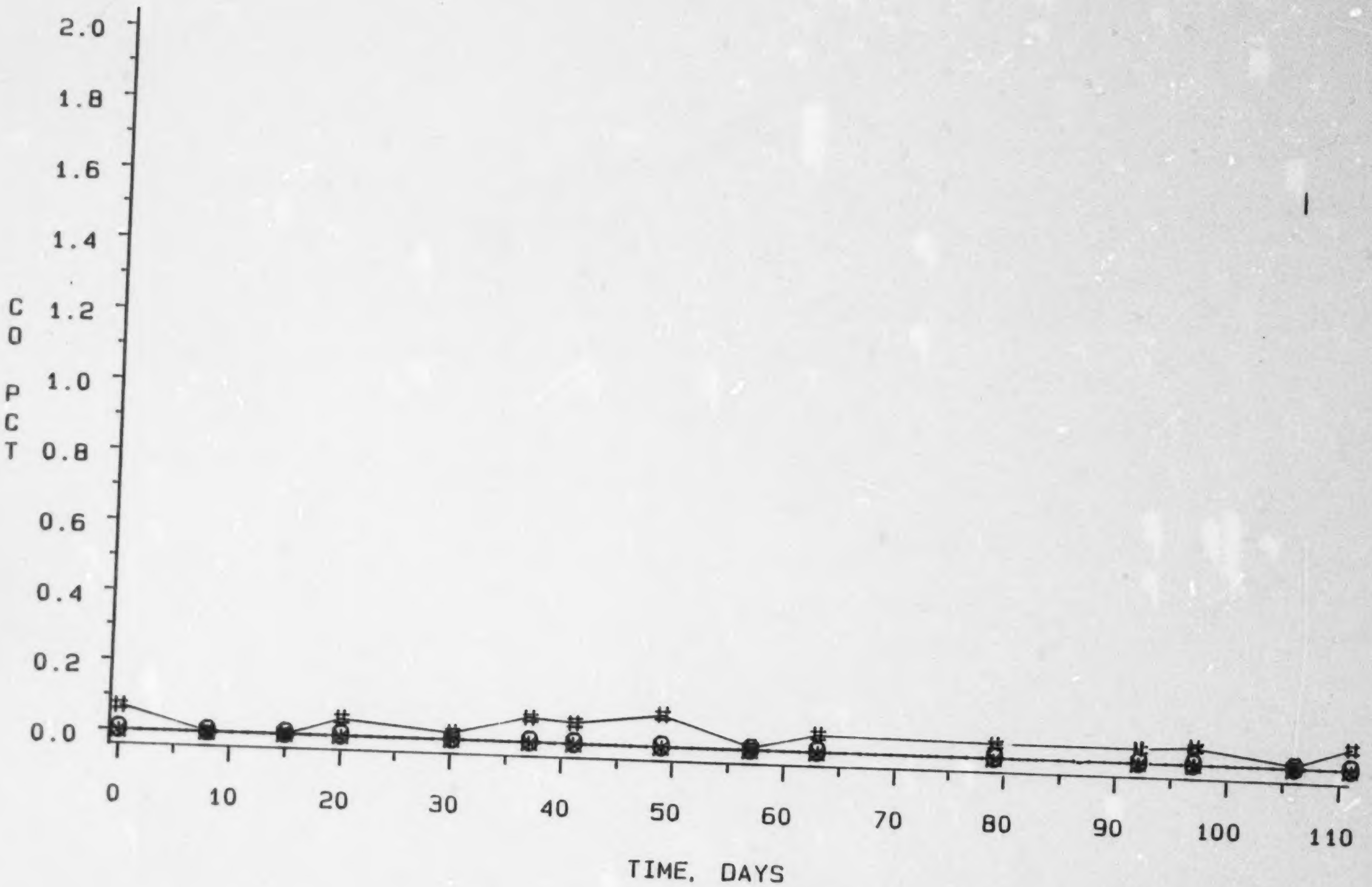


FIGURE I-7. VEHICLE 7 - 1987 JEEP CHEROKEE, CO-2500 RPM VS TIME

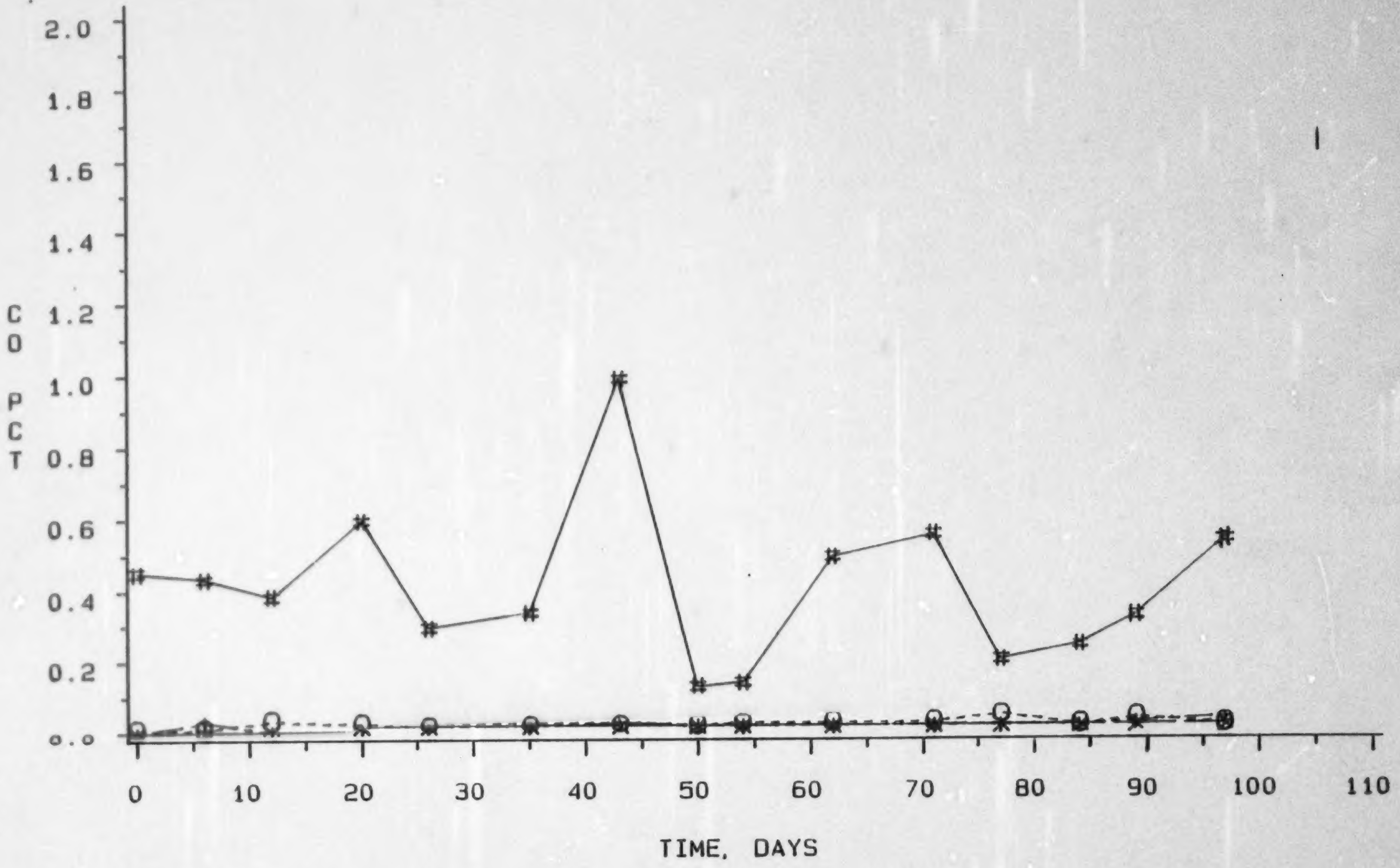
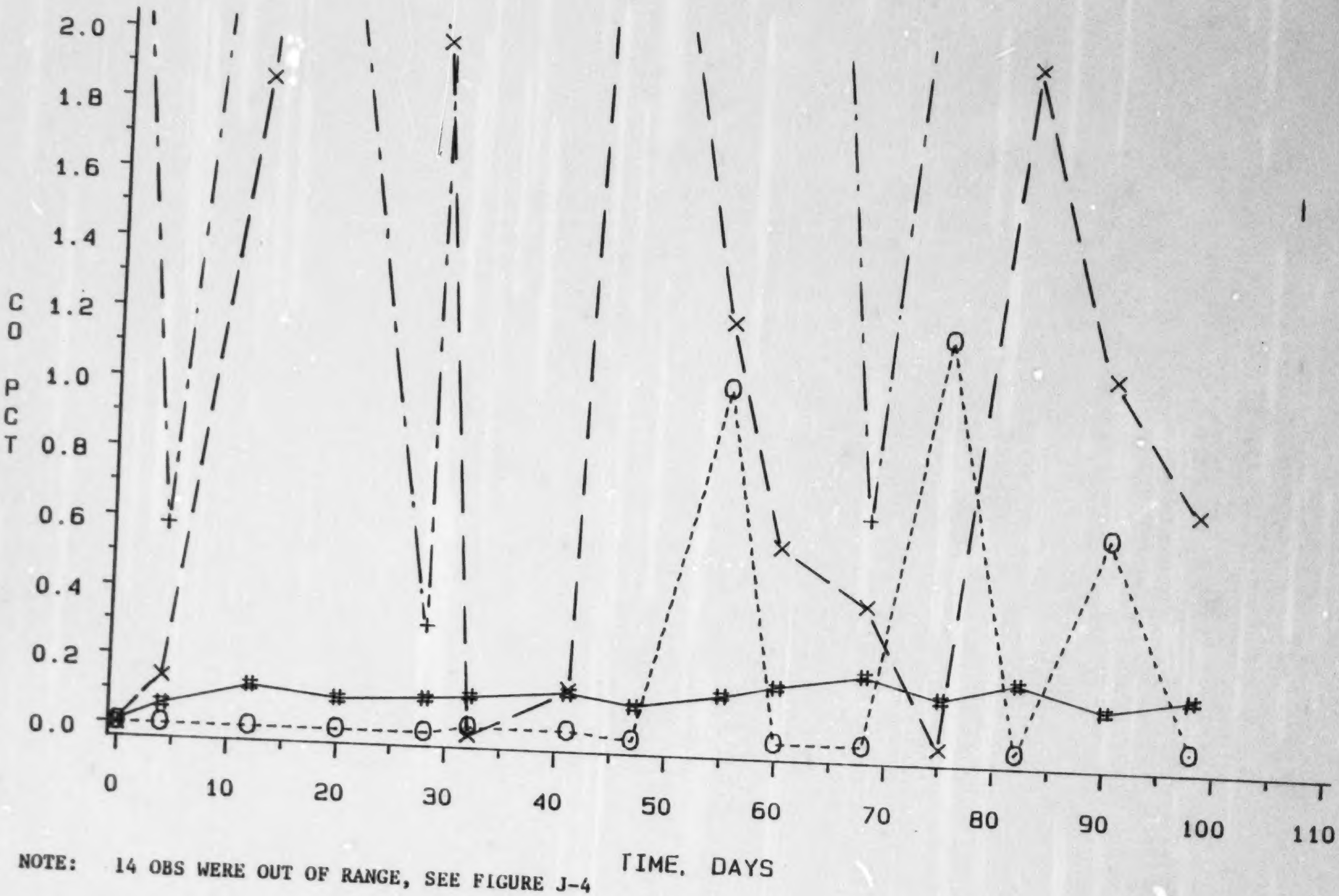


FIGURE I-8. VEHICLE 8 - 1982 PEUGEOT 505, CO-2500 RPM VS TIME



NOTE: 14 OBS WERE OUT OF RANGE, SEE FIGURE J-4

FIGURE I-9. VEHICLE 9 - 1985 VOLKSWAGEN GOLF, CO-2500 RPM VS TIME

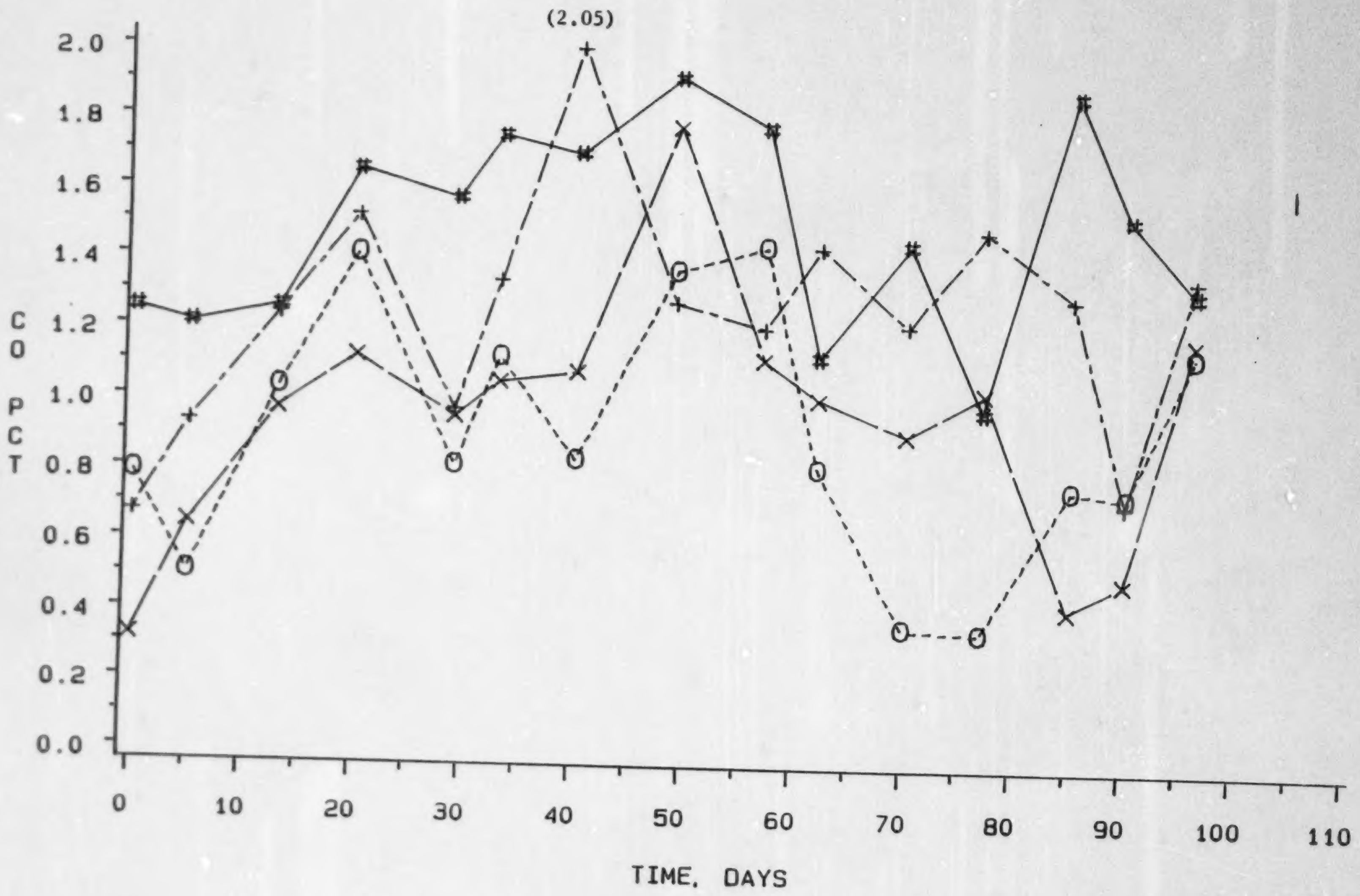


FIGURE I-10. VEHICLE 10 - 1985 BMW 318i, CO-2500 RPM VS TIME

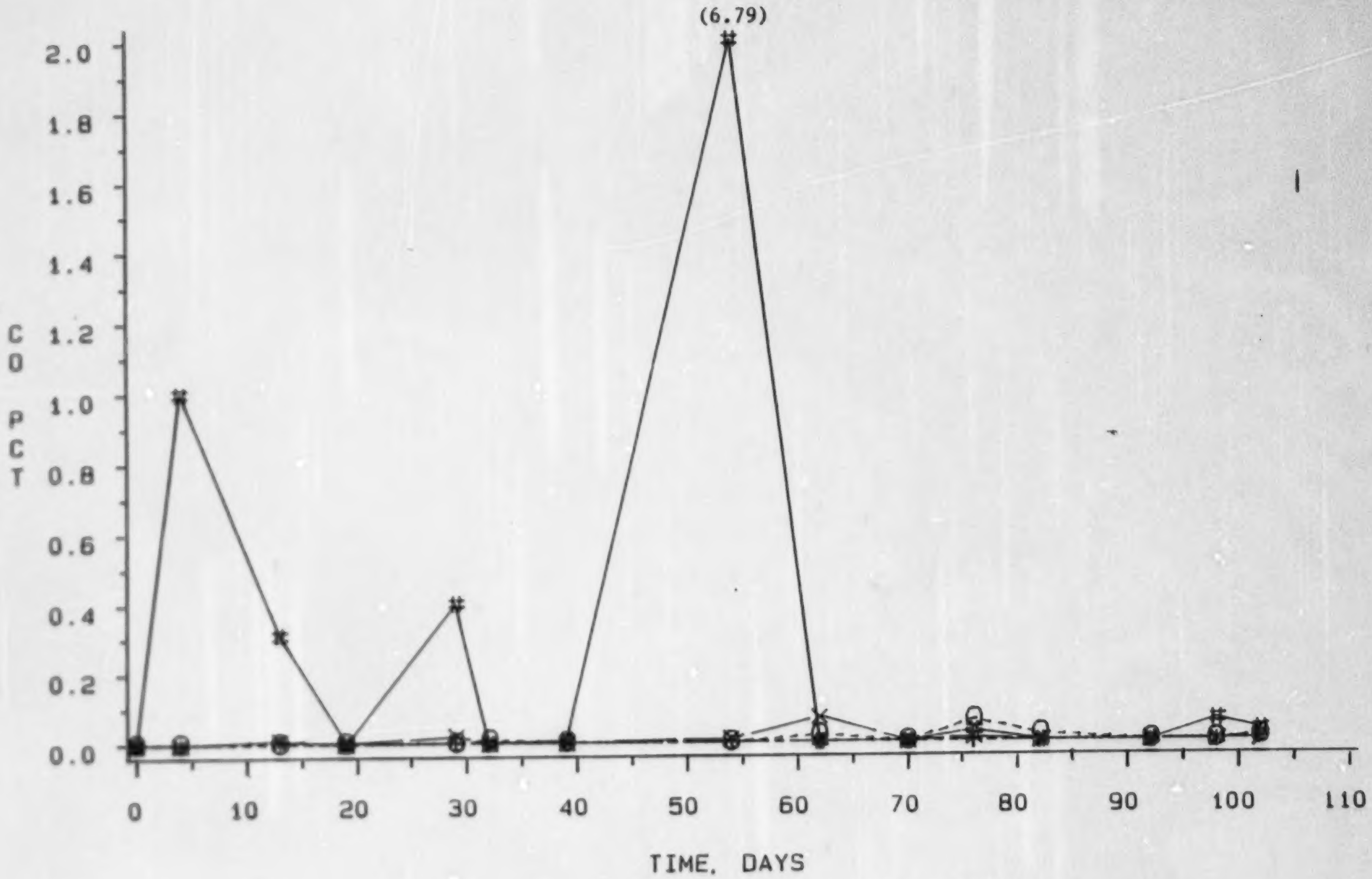


FIGURE I-11. VEHICLE 11 – 1986 NISSAN PULSAR, CO-2500 RPM VS TIME

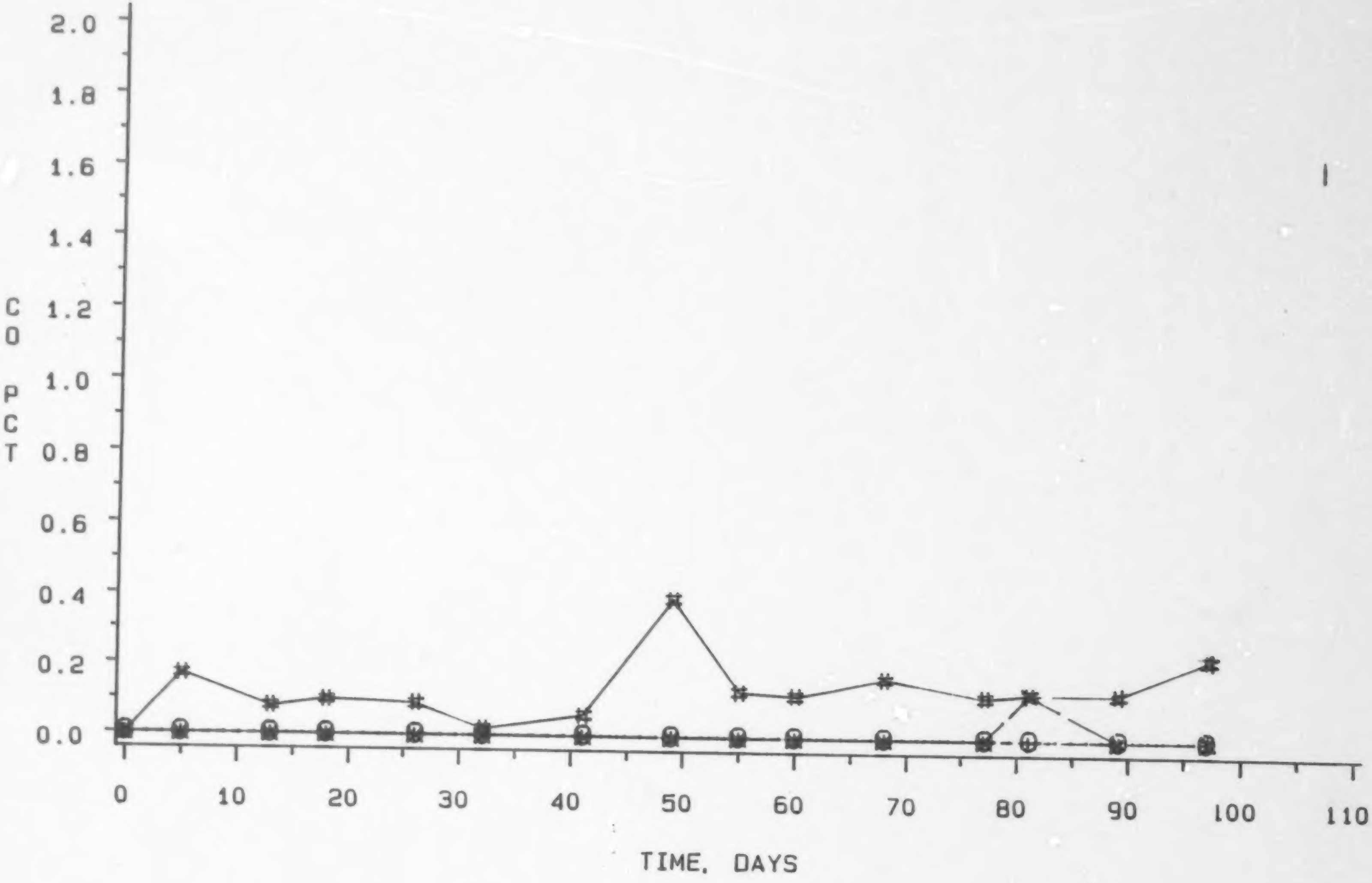


FIGURE I-12. VEHICLE 12 - 1984 CHEVROLET SUBURBAN, CO-2500 RPM VS TIME

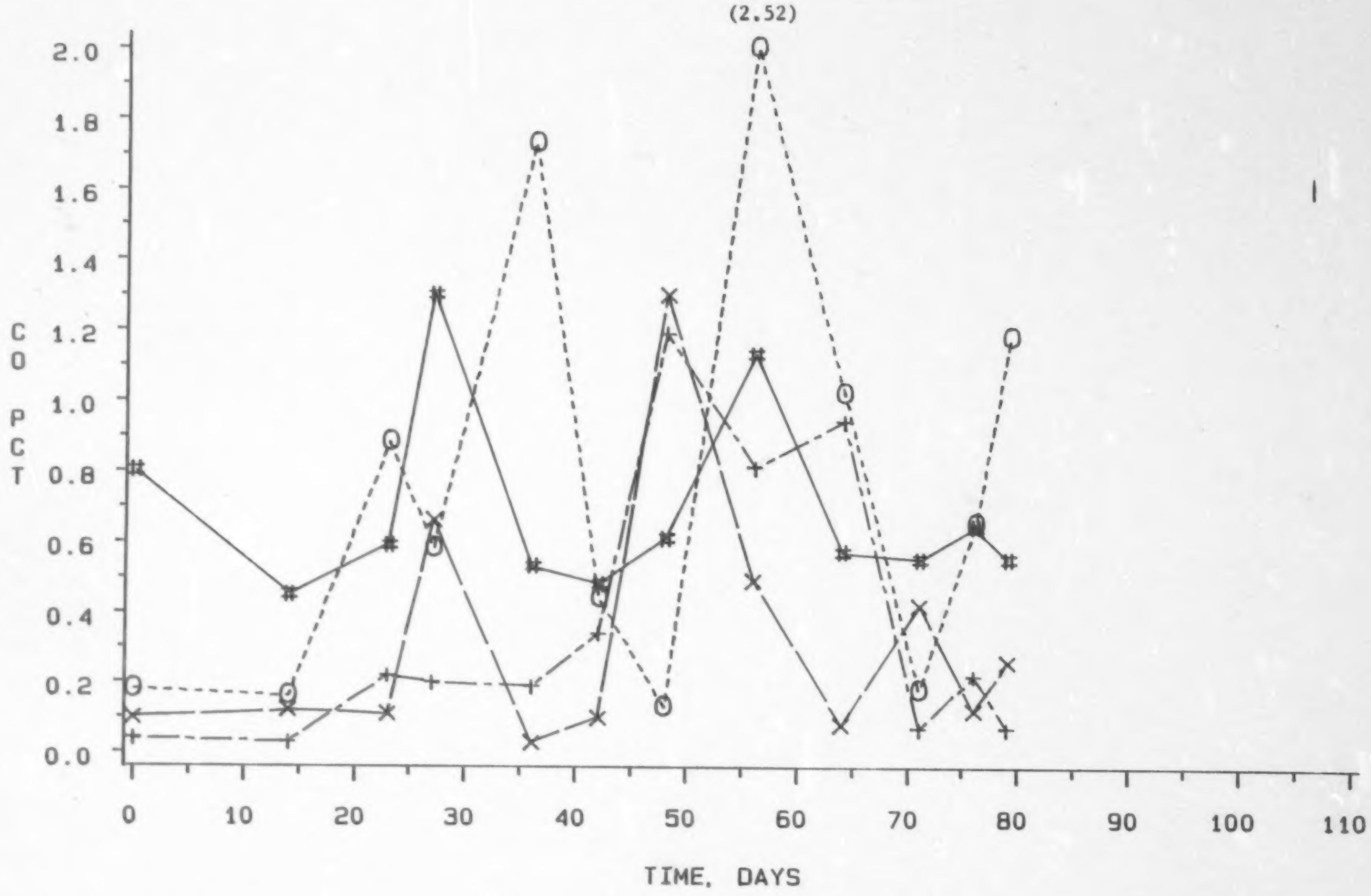


FIGURE I-13. VEHICLE 13 - 1985 FORD RANGER, CO-2500 RPM VS TIME

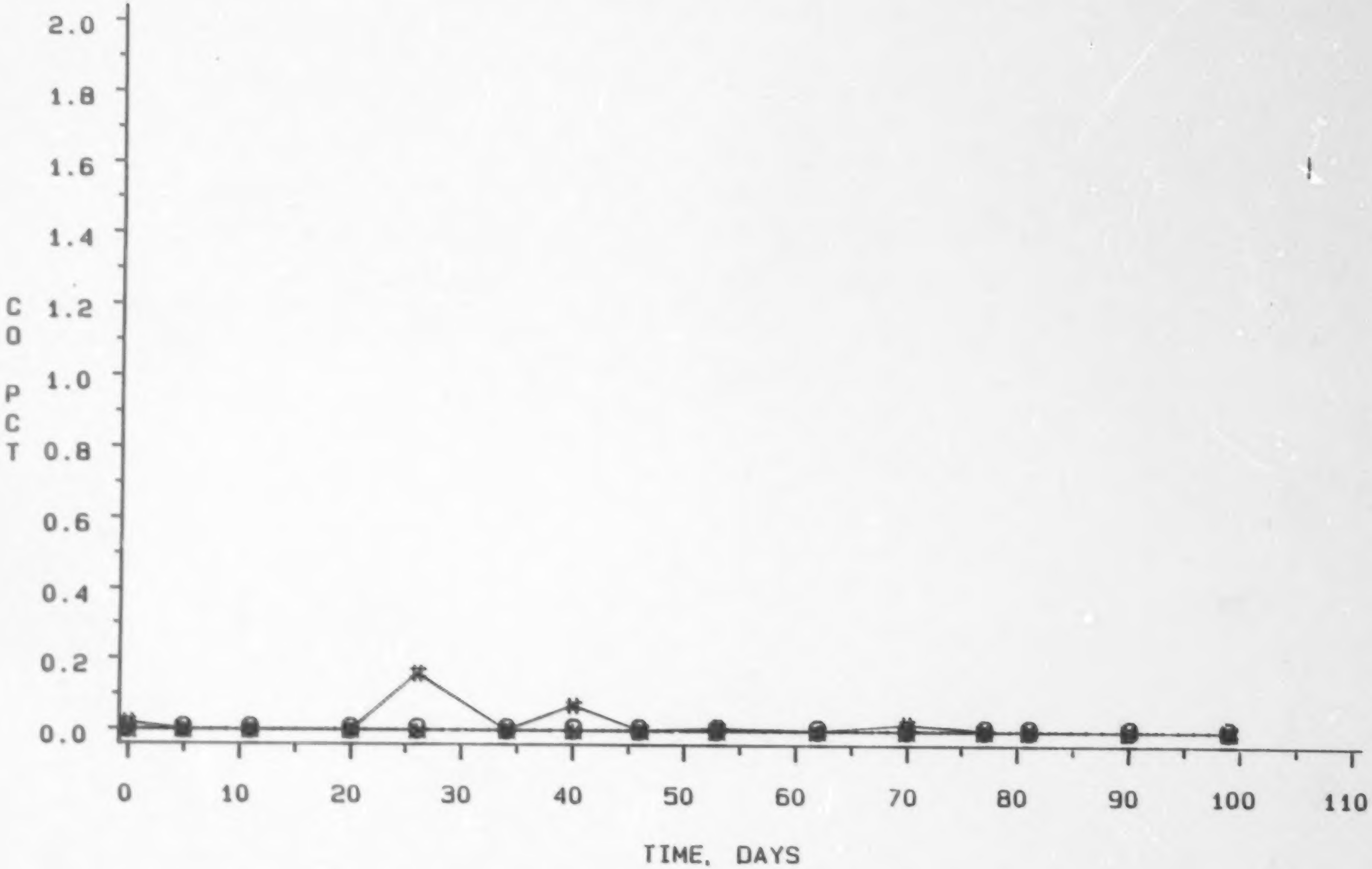


FIGURE I-14. VEHICLE 14 - 1986 OLDSMOBILE CUTLASS SUPREME, CO-2500 RPM VS TIME

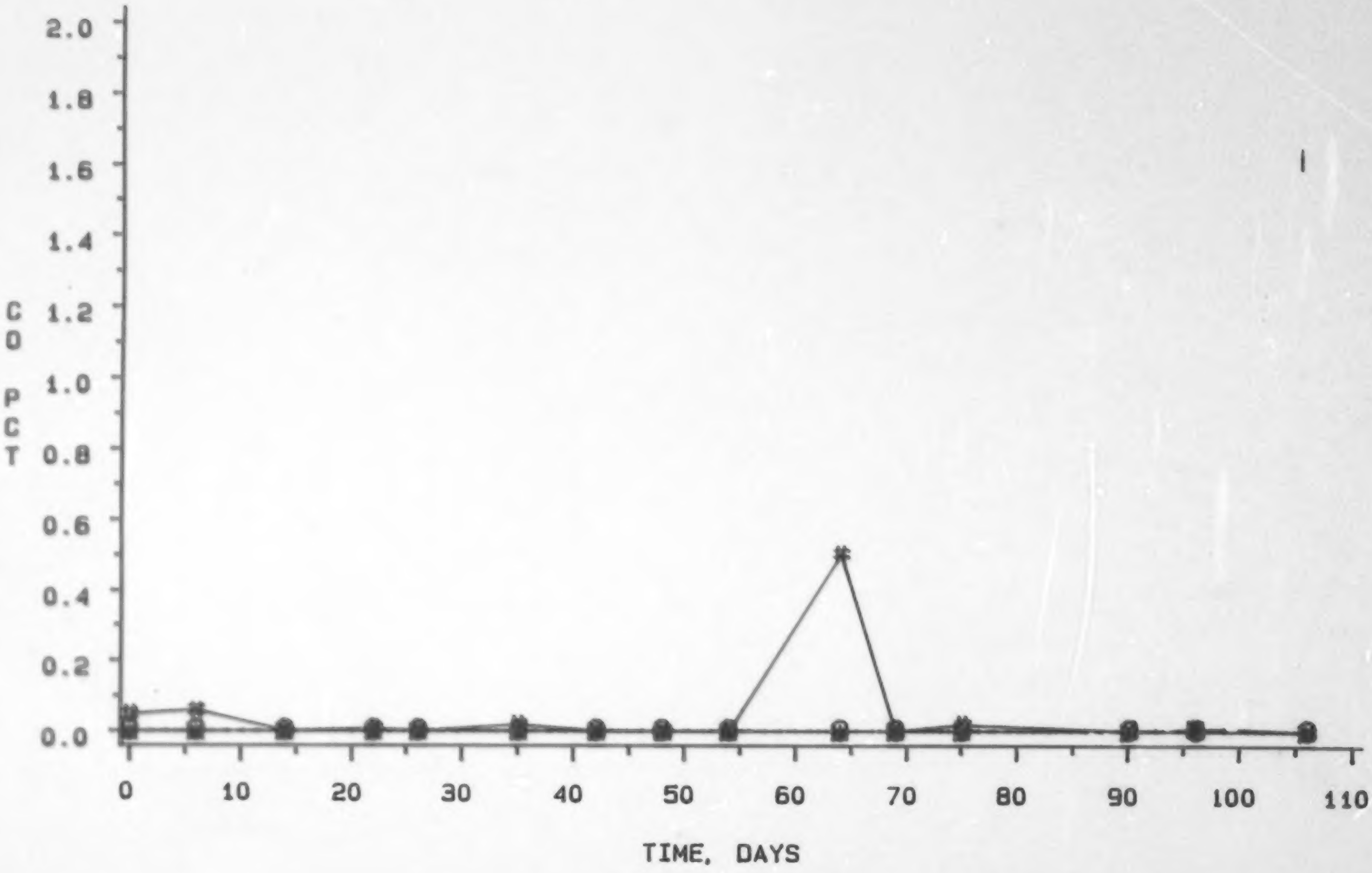
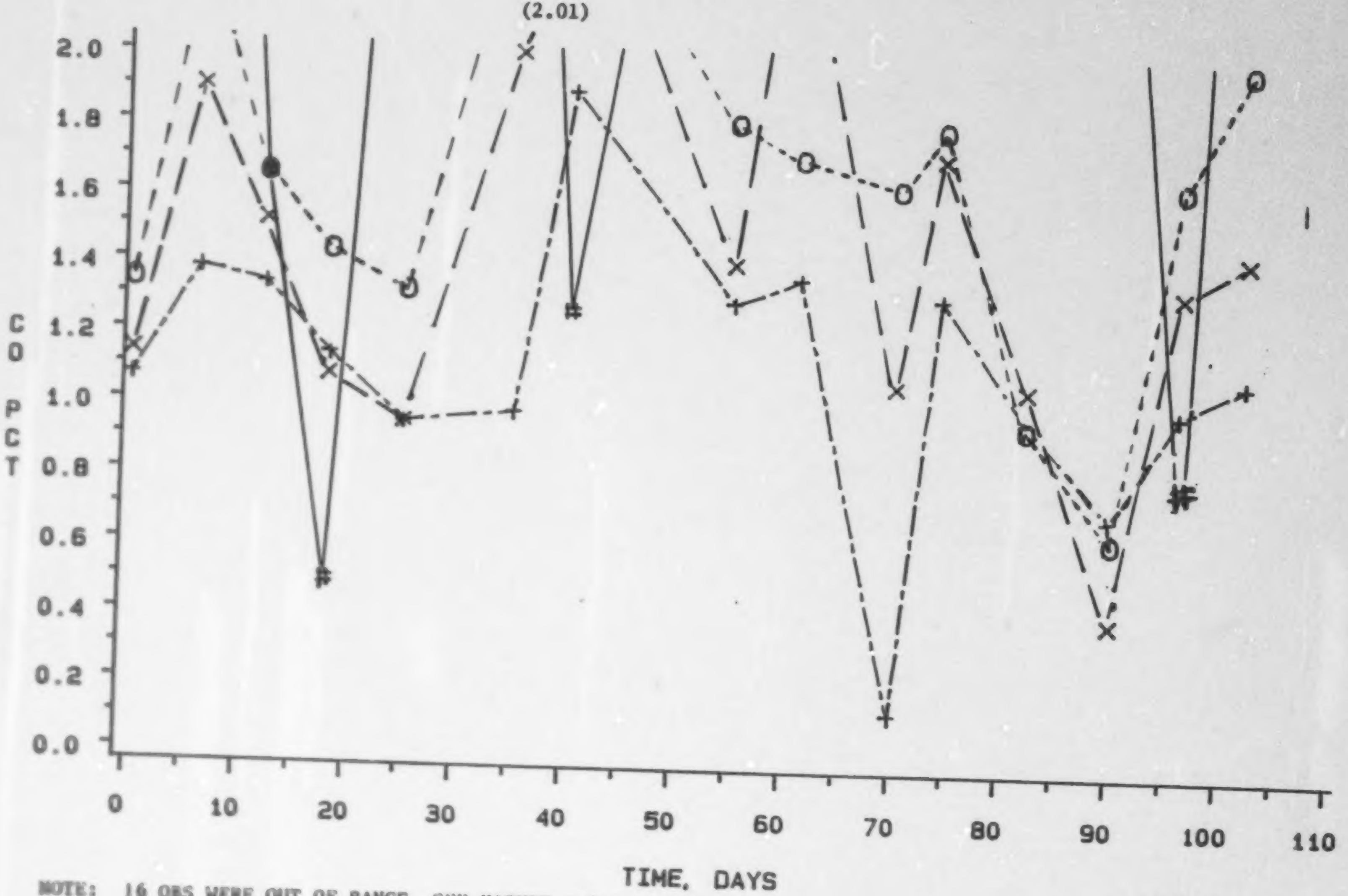


FIGURE I-15. VEHICLE 15 – 1987 HYUNDAI EXCEL GS, CO-2500 RPM VS TIME



NOTE: 16 OBS WERE OUT OF RANGE, SEE FIGURE J-5

FIGURE I-16. VEHICLE 16 - 1986 FORD THUNDERBIRD, CO-2500 RPM VS TIME

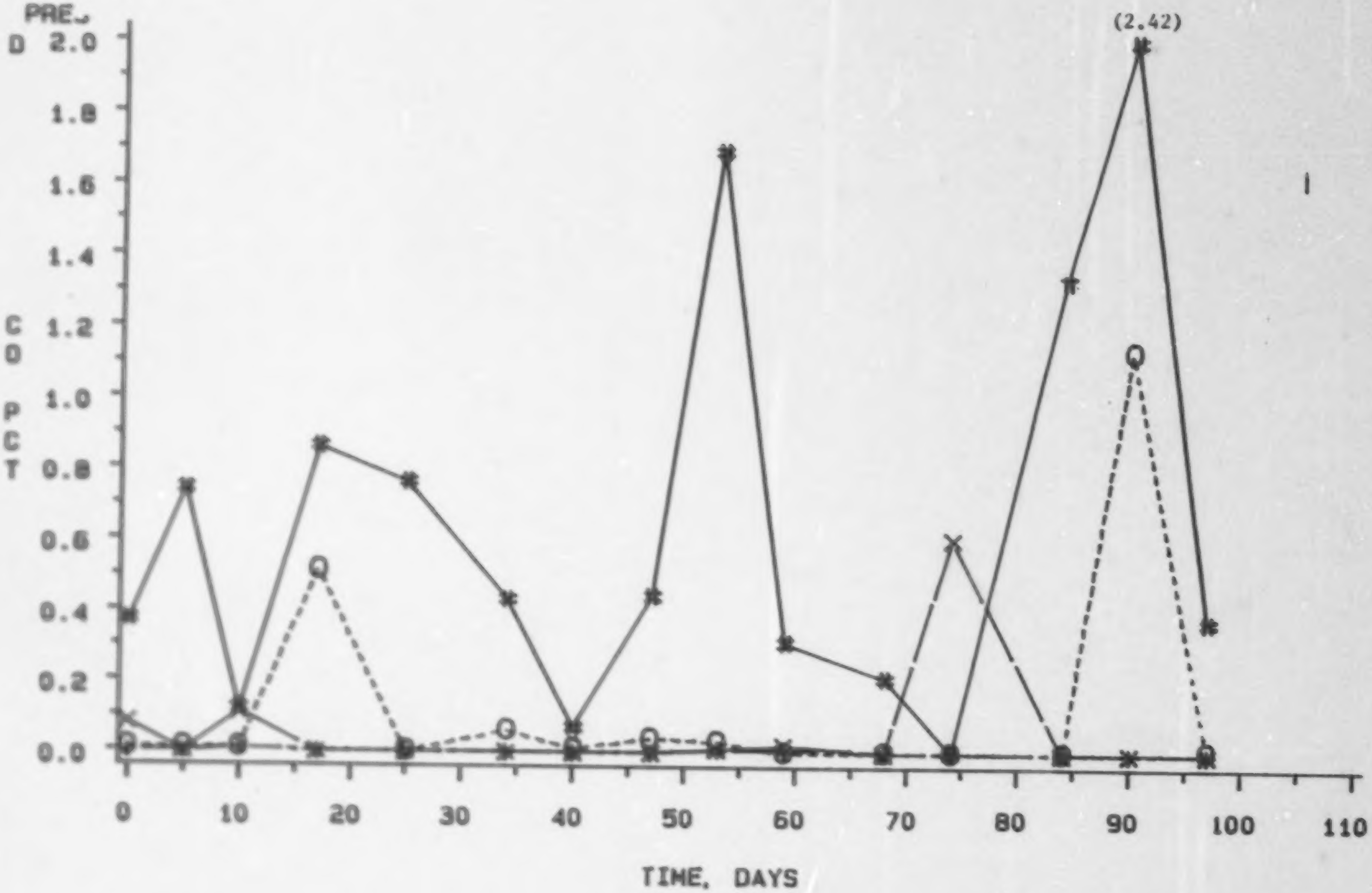


FIGURE I-17. VEHICLE 17 - 1984 FORD E-150, CO-2500 RPM VS TIME

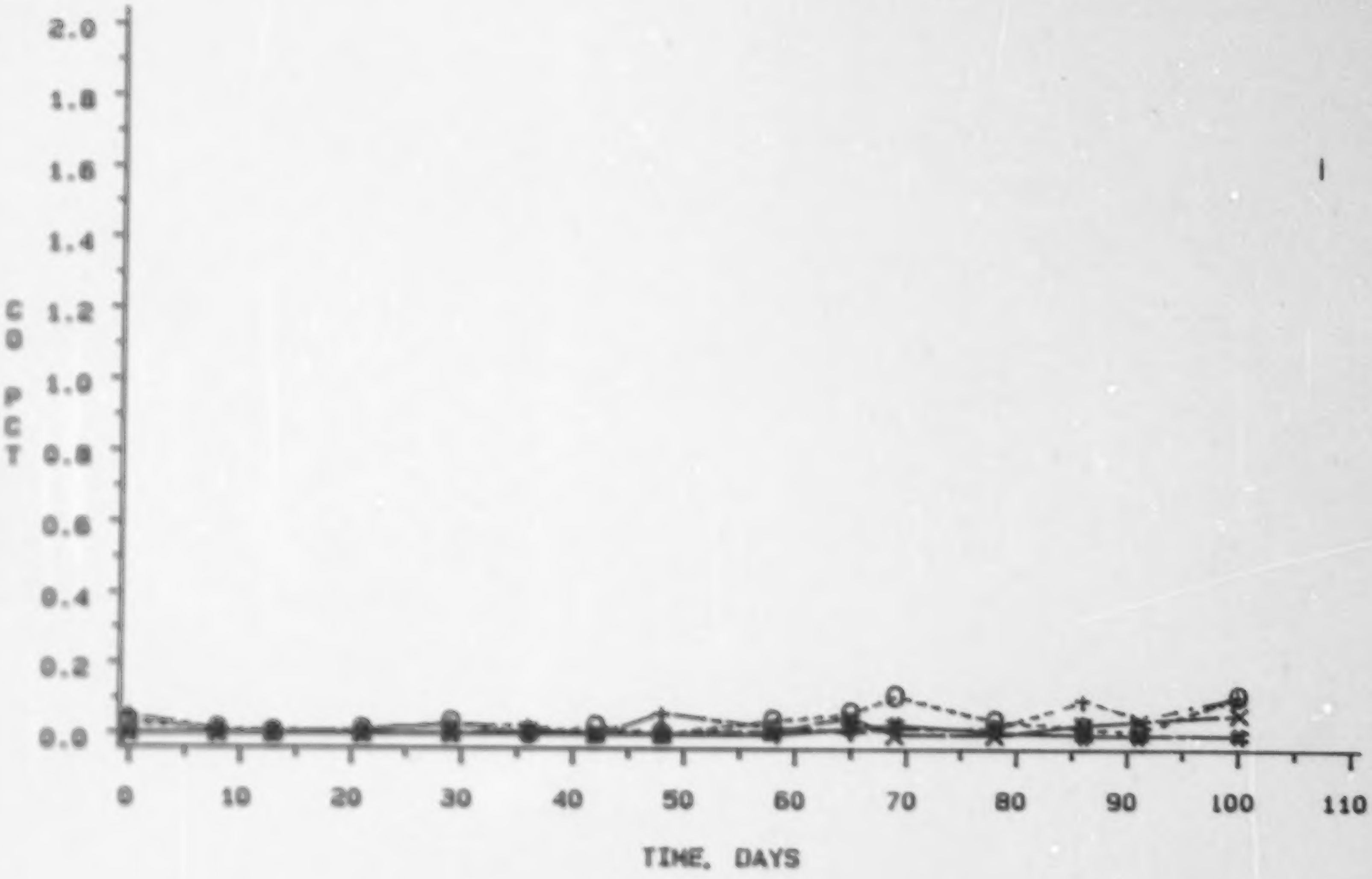


FIGURE 3-18. VEHICLE 18 - 1984 CHEVROLET CAPRICE CLASSIC, CO-2500 RPM VS TIME

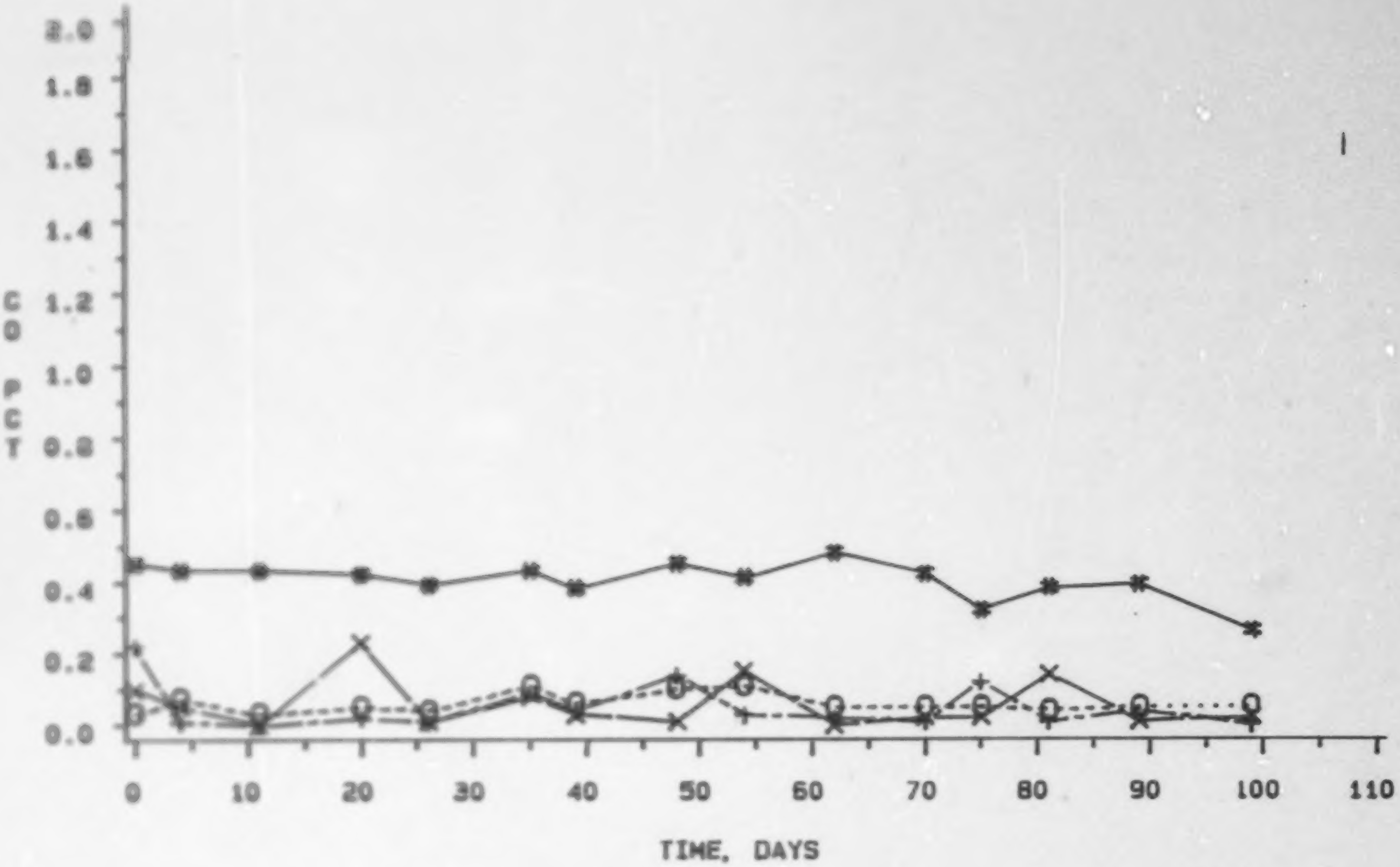


FIGURE I-19. VEHICLE 19 - 1985 CHEVROLET CAVALIER, CO-2500 RPM VS TIME

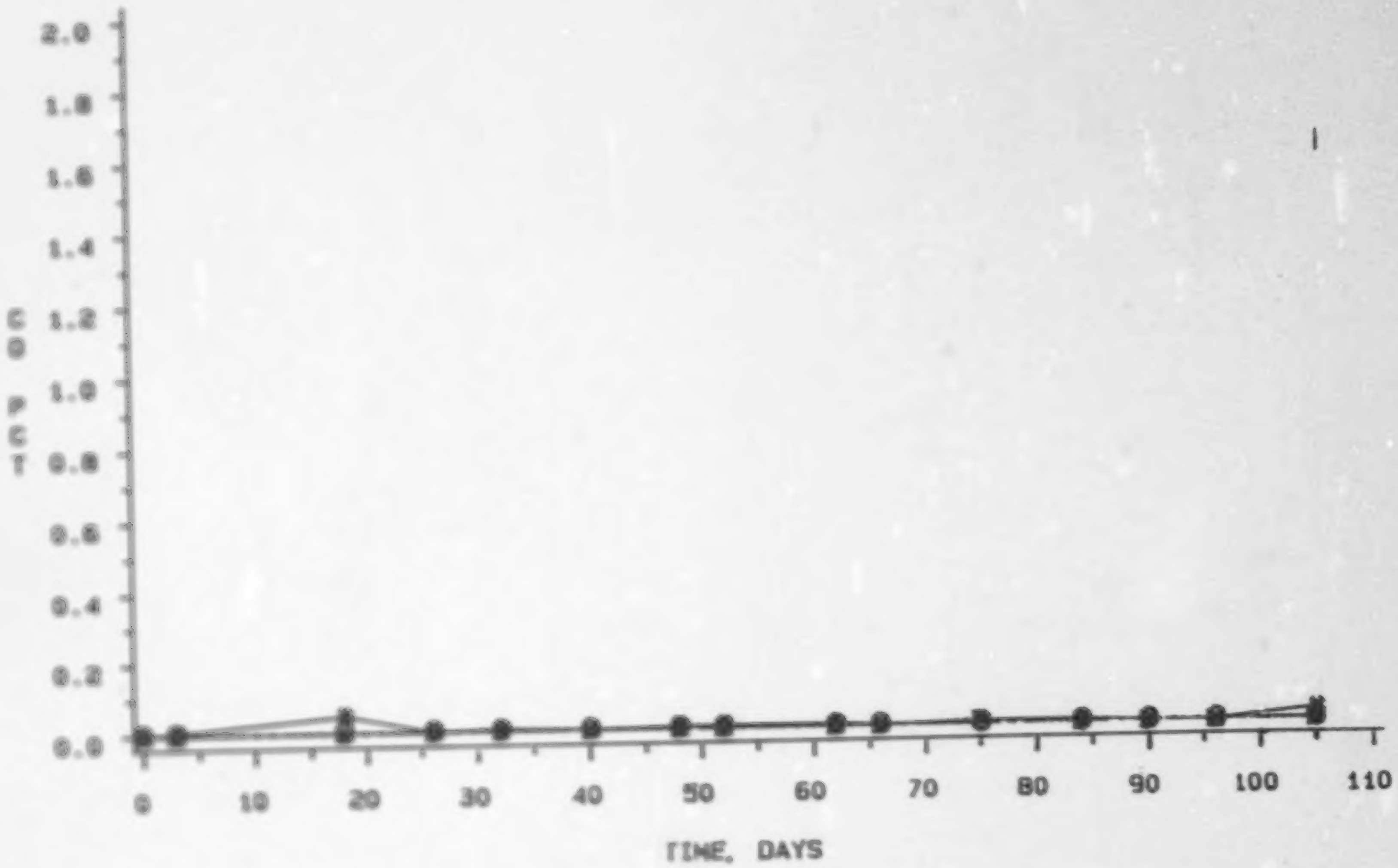


FIGURE I-20. VEHICLE 20 - 1987 BUICK LESABRE, CO-2500 RPM VS TIME

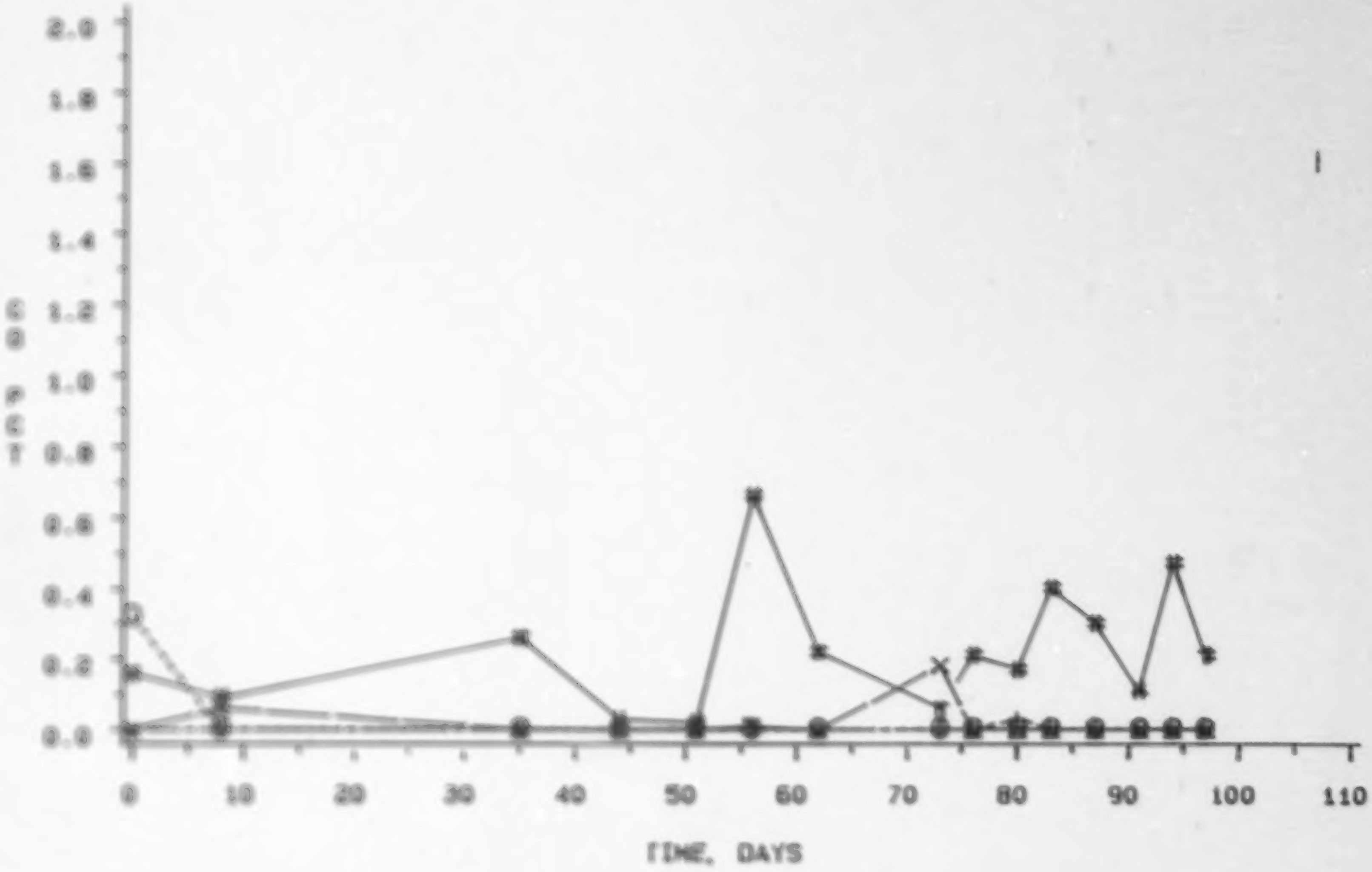


FIGURE 5-21. VEHICLE 21 - 1982 VOLKSWAGEN SCIRROCO, CO-2500 RPM VS TIME

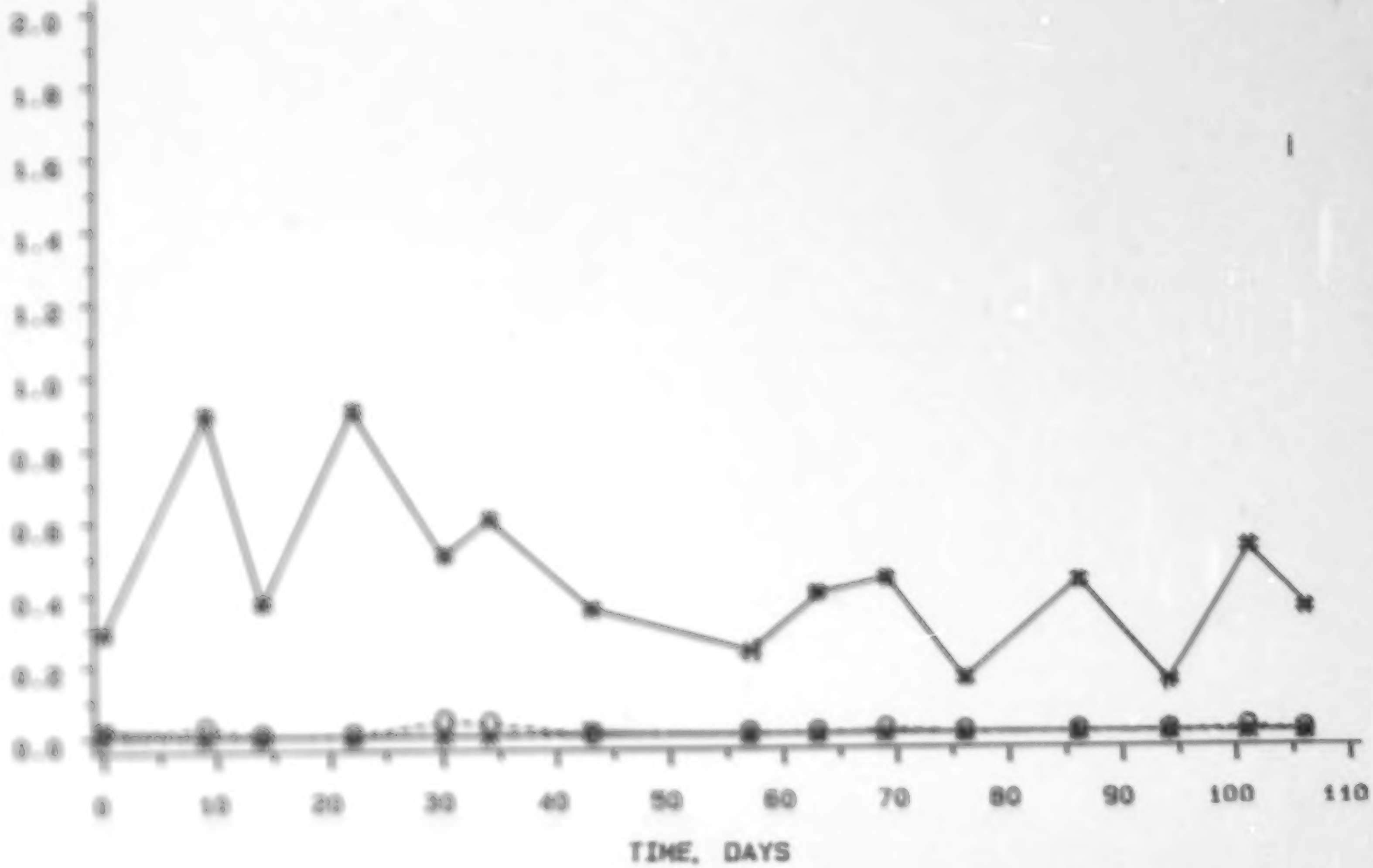


FIGURE 5-22. VEHICLE 22 - 1987 CHEVROLET ASTRO, CO-2500 RPM VS TIME

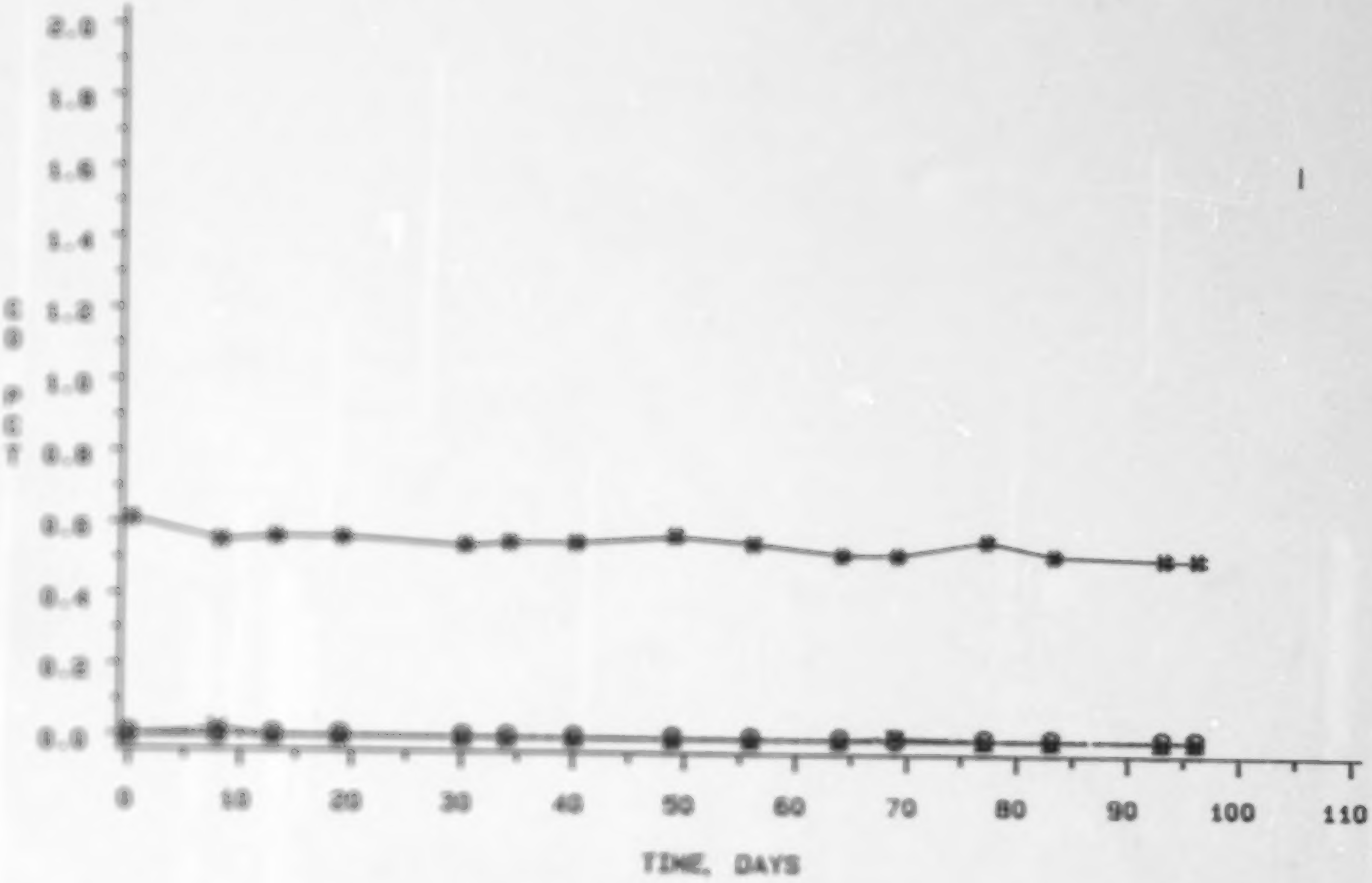


FIGURE 3-23. VEHICLE 23 - 1987 NISSAN PULSAR, CO-2500 RPM VS TIME

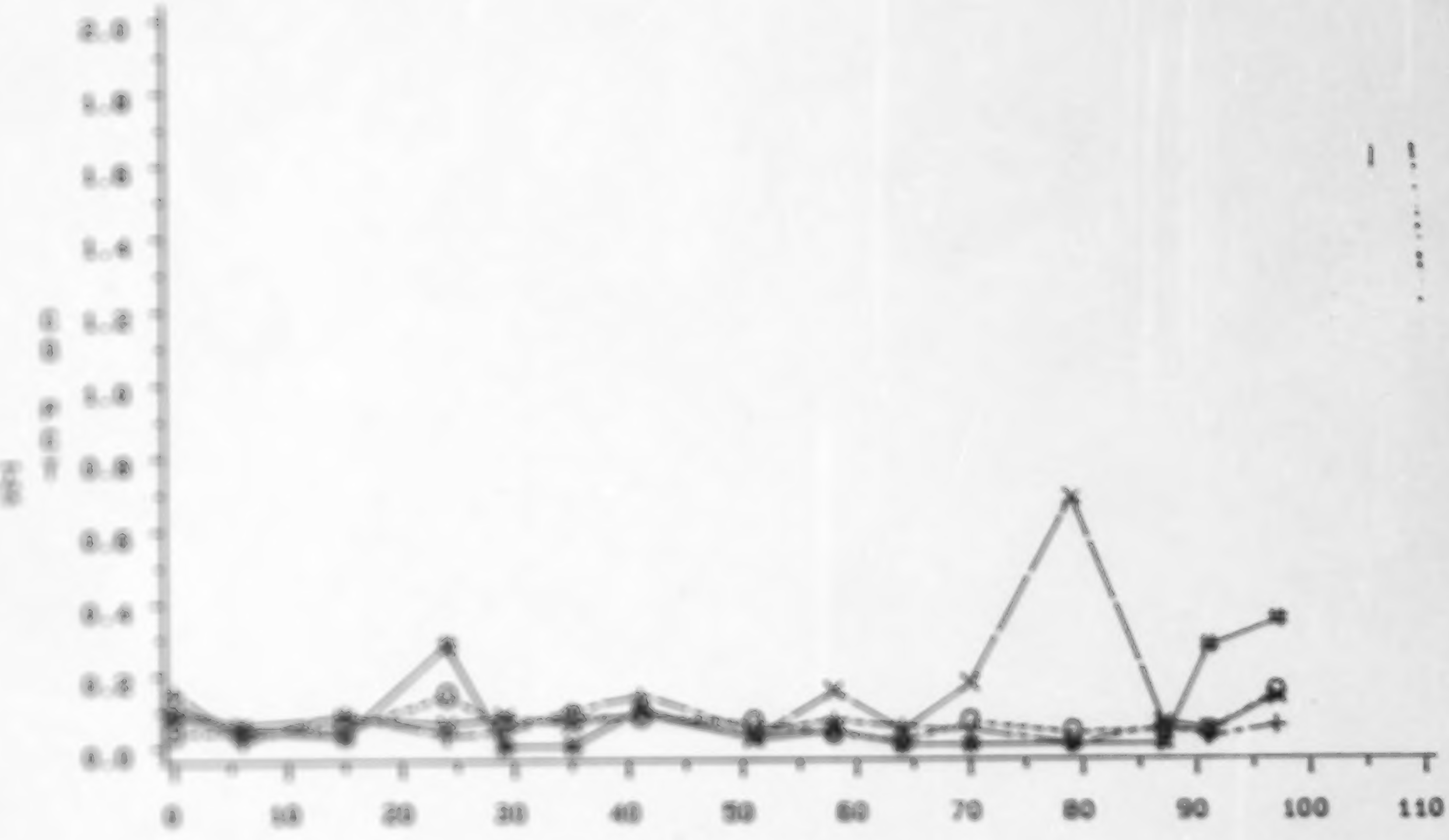
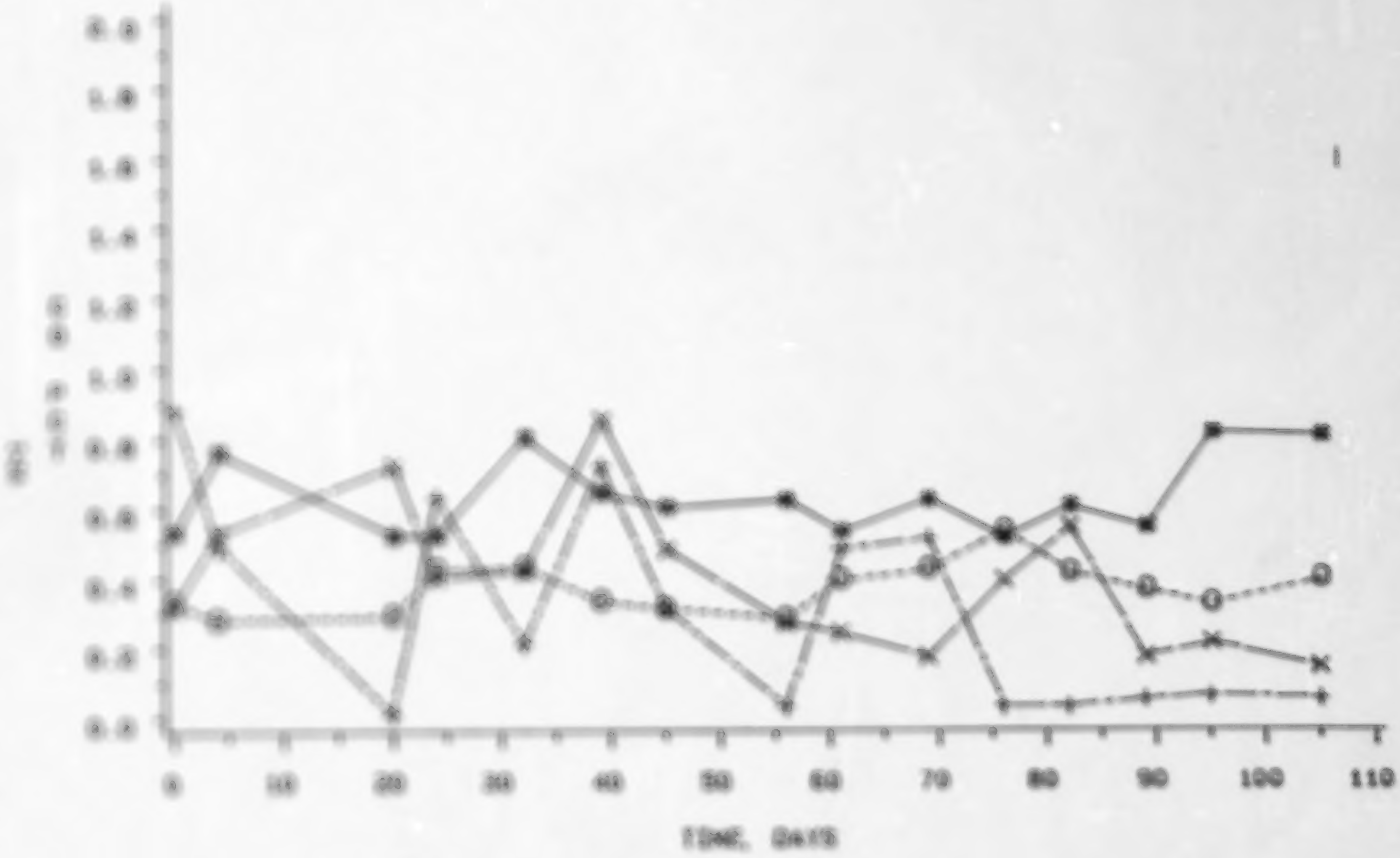


FIGURE [illegible]. VEHICLE [illegible] - 1986 BUICK CENTURY, CO-2500 RPM VS TIME


0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
0
10
20
30
40
50
60
70
80
90
100
110
TIME, DAYS

[illegible]

APPENDIX J

REPLOTS OF CO-2500 RPM EMISSIONS VERSUS TIME
0-4, 0-6, or 0-7 PERCENT SCALE

Figure J-	Vehicle No.	Vehicle Make and Model
1	03	Oldsmobile Delta 88
2	05	Honda Civic
3	06	Honda Accord
4	09	Volkswagen Golf
5	16	Ford Tunderbird

Legend for Plots

x - Before 2500 rpm conditioning - am
+ - After 2500 rpm conditioning - am
# - Before 2500 rpm conditioning - pm
0 - After 2500 rpm conditioning - pm

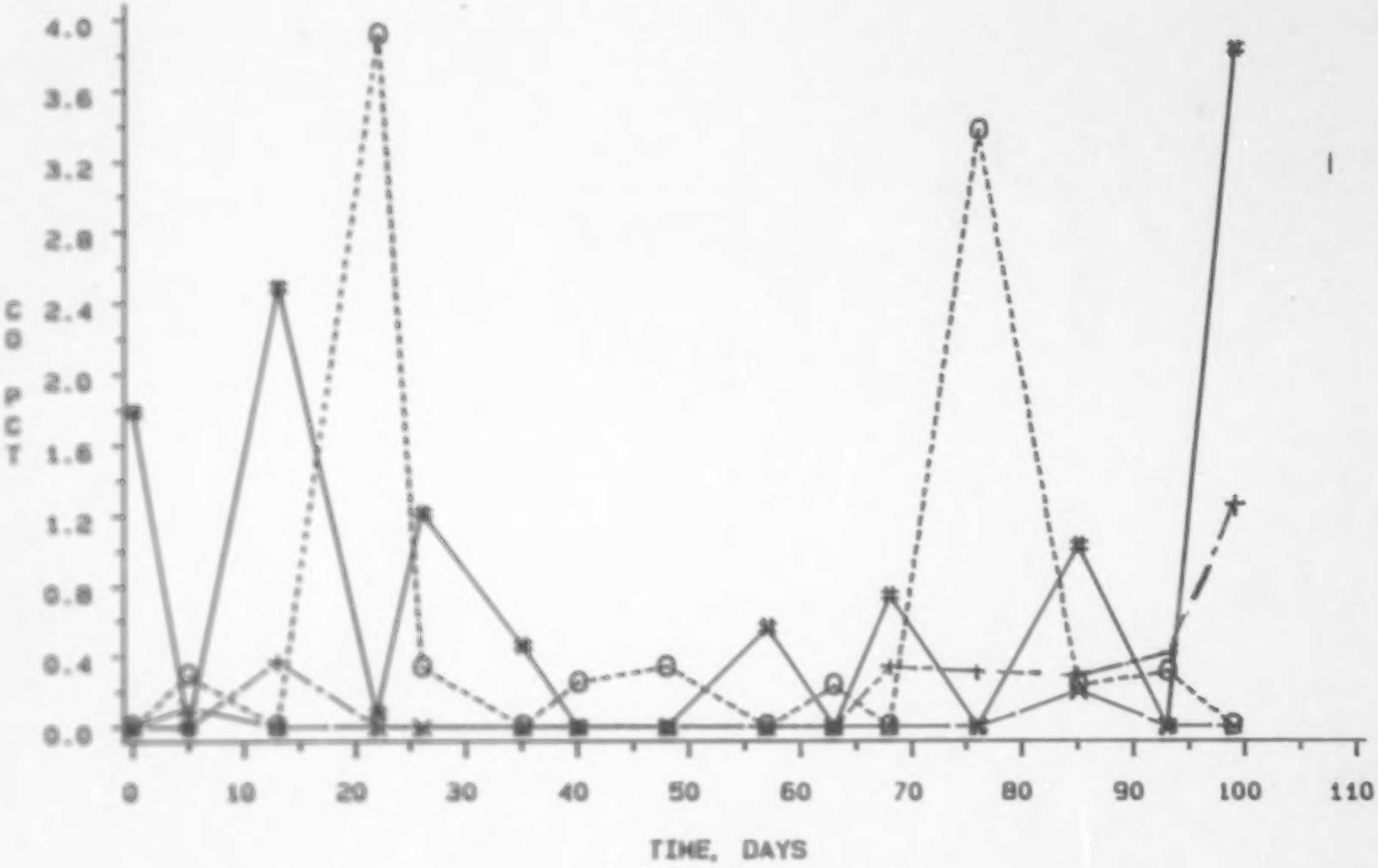


FIGURE J-1. VEHICLE 3 - 1984 OLDSMOBILE DELTA 88, CO-2500 RPM VS TIME

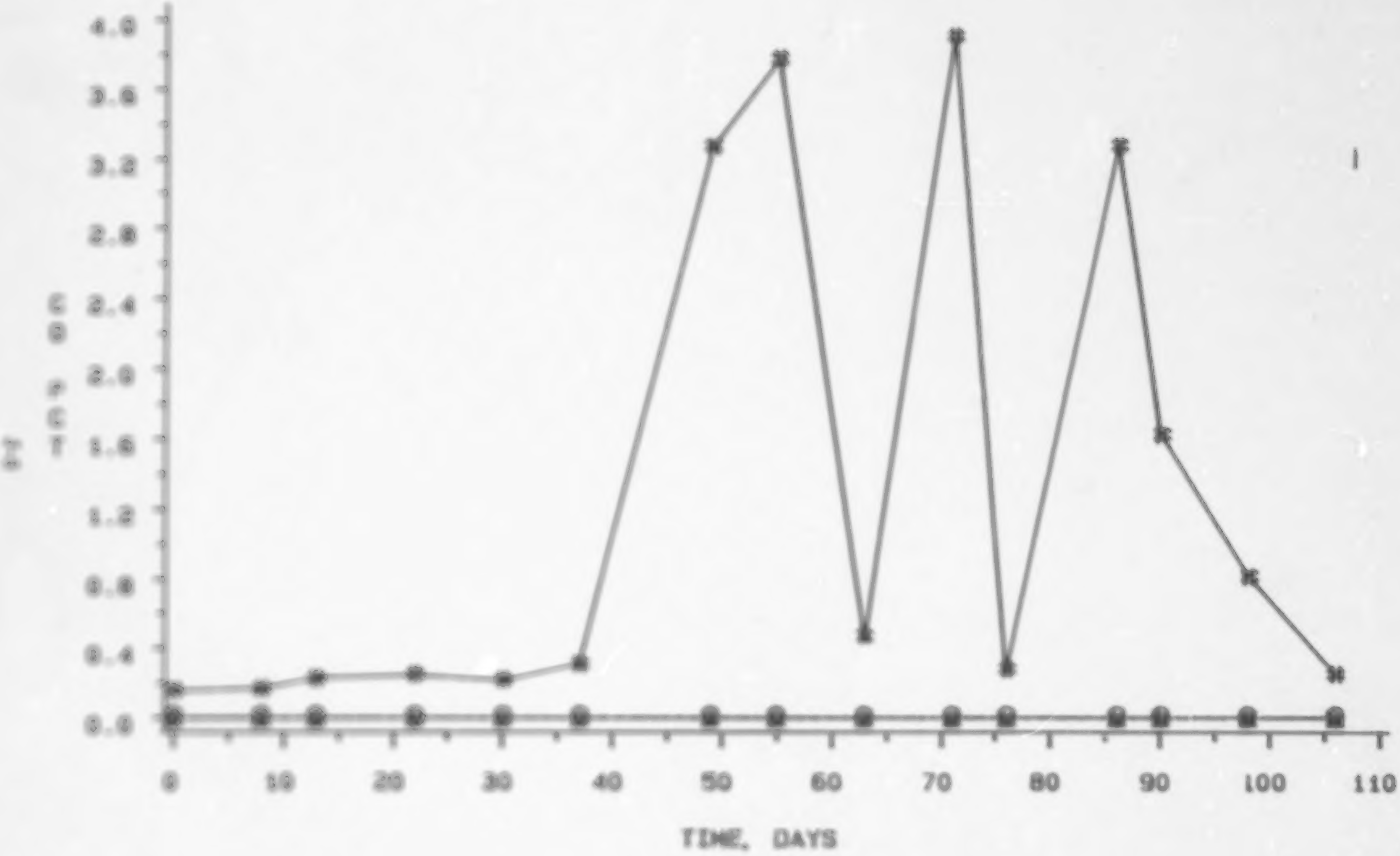


FIGURE 3-2. VEHICLE 5 - 1981 HONDA CIVIC, CO-2500 RPM VS TIME

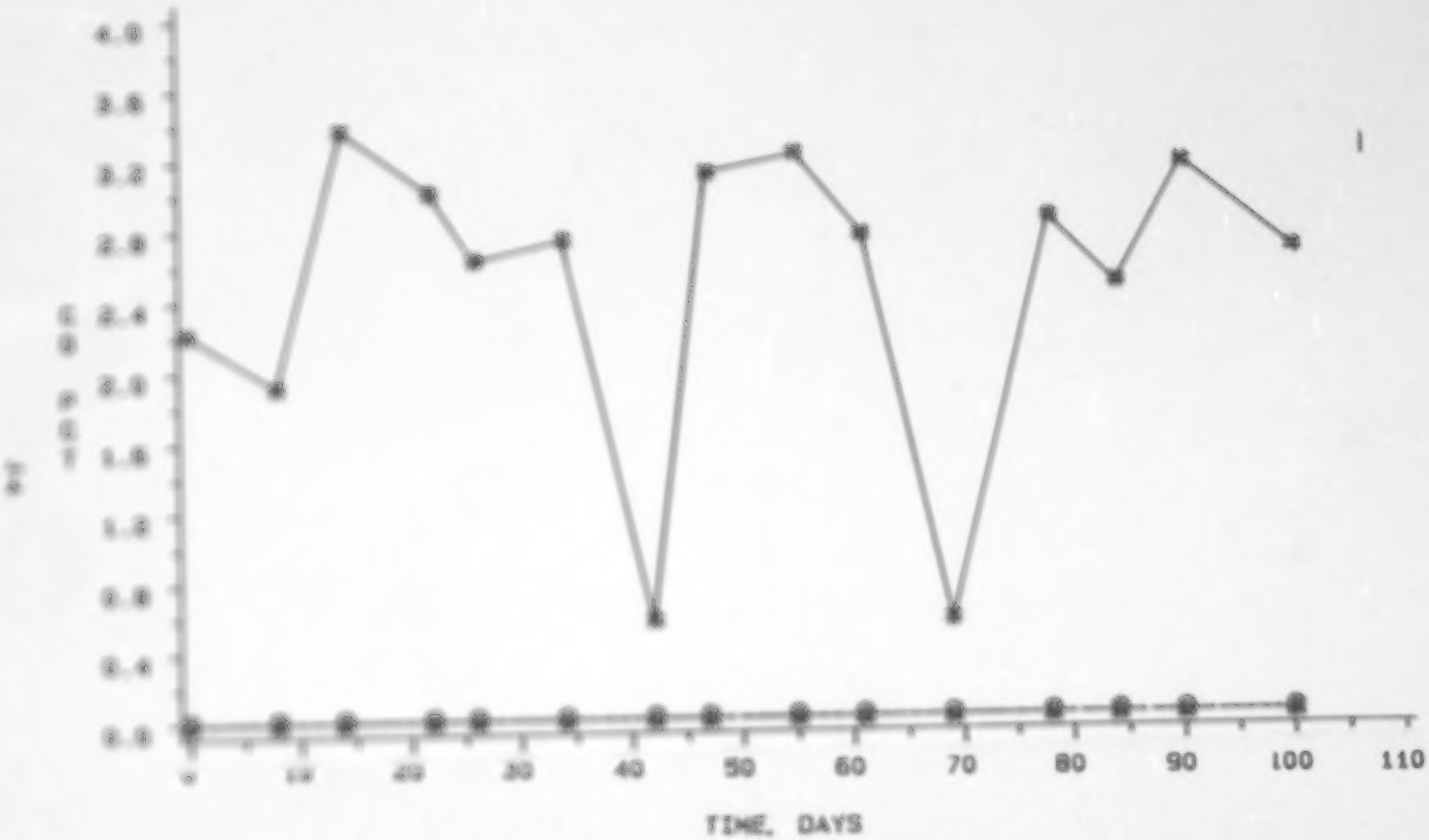


FIGURE J-6. VEHICLE 6 - 1985 HONDA ACCORD, CO-2500 RPM VS TIME

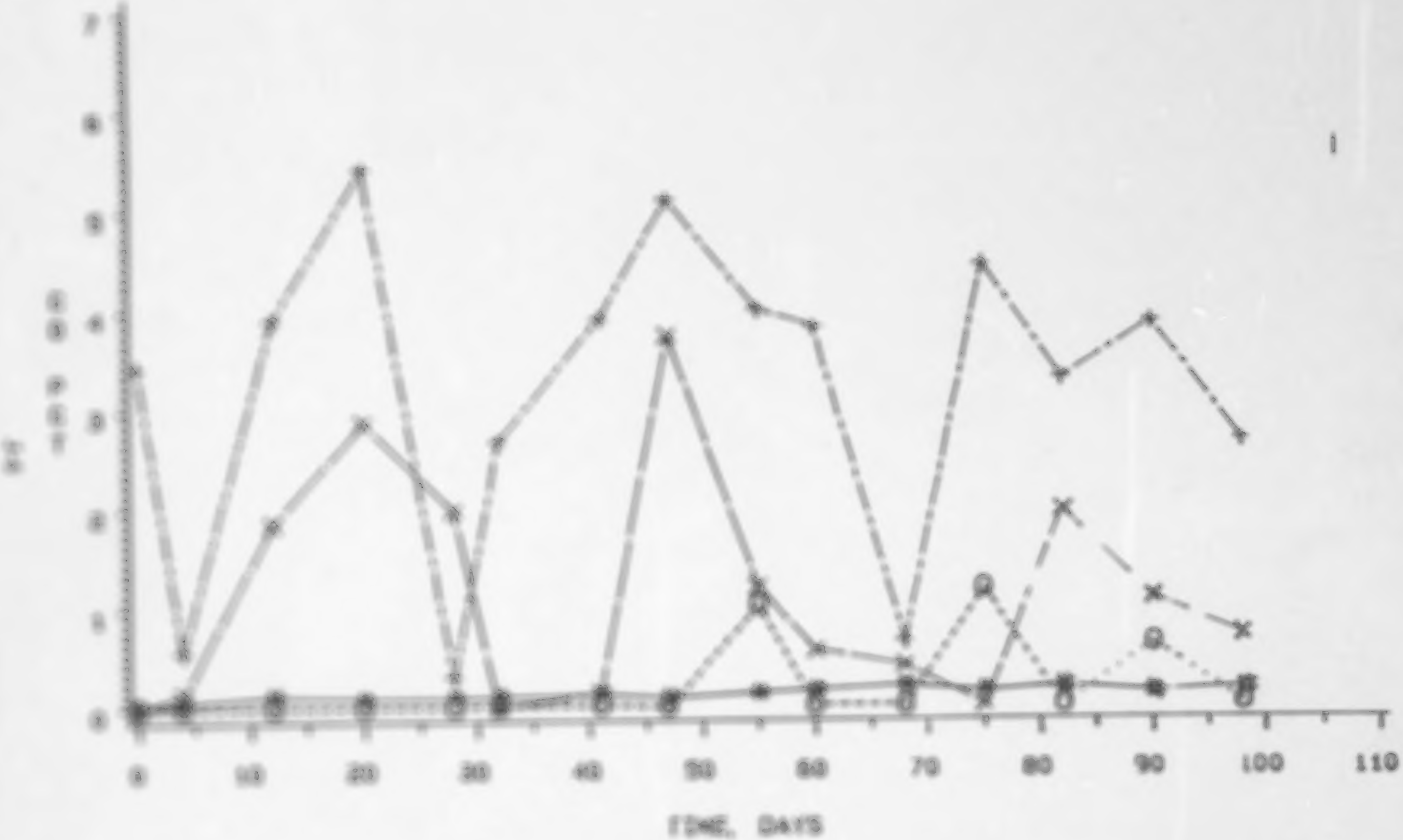


FIGURE J-9. VEHICLE 9 - 1980 VOLKSWAGEN GOLF, CO-2500 RPM VS TIME

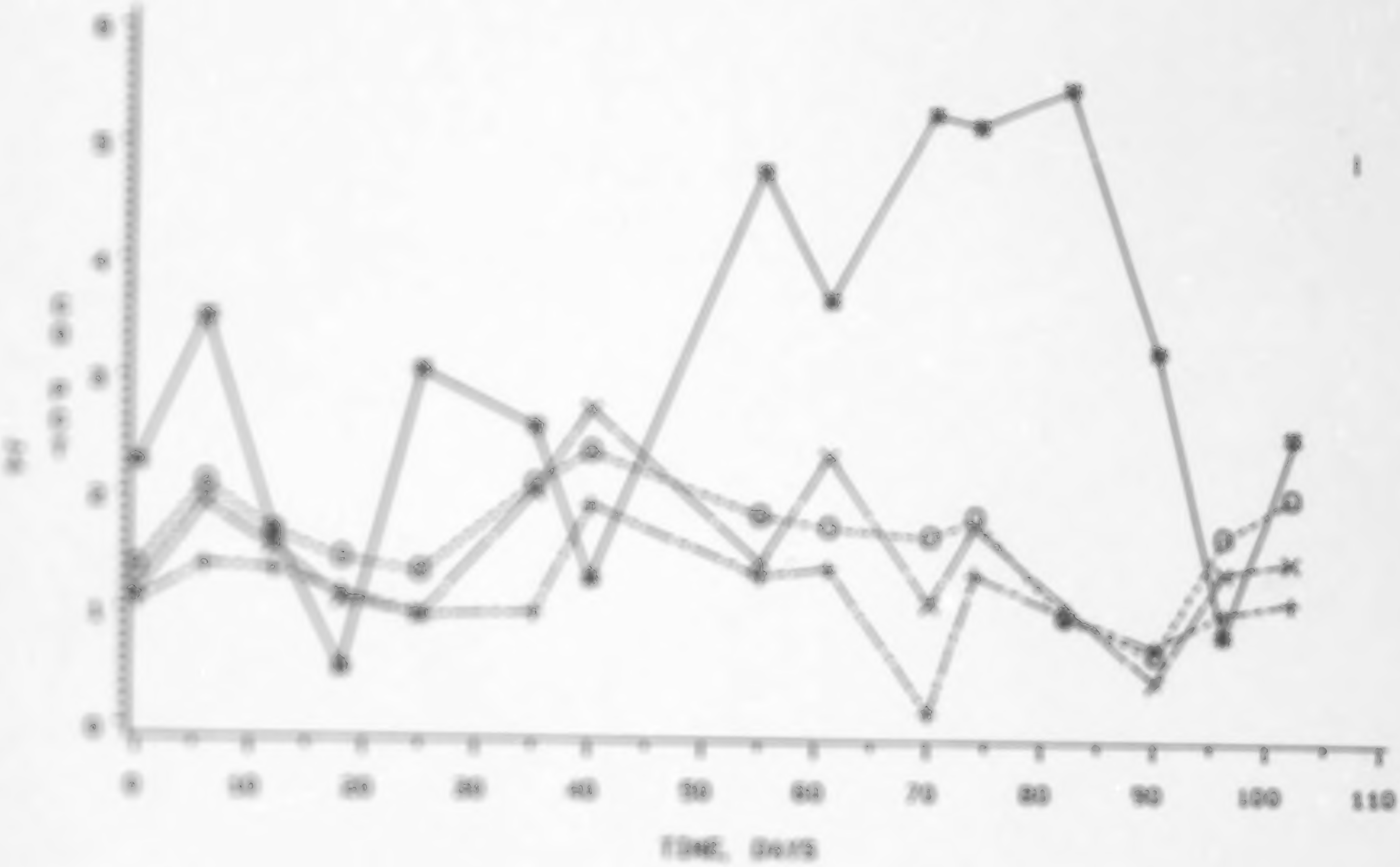


FIGURE [illegible]. VEHICLE [illegible] - [illegible], [illegible] RPM VS TIME

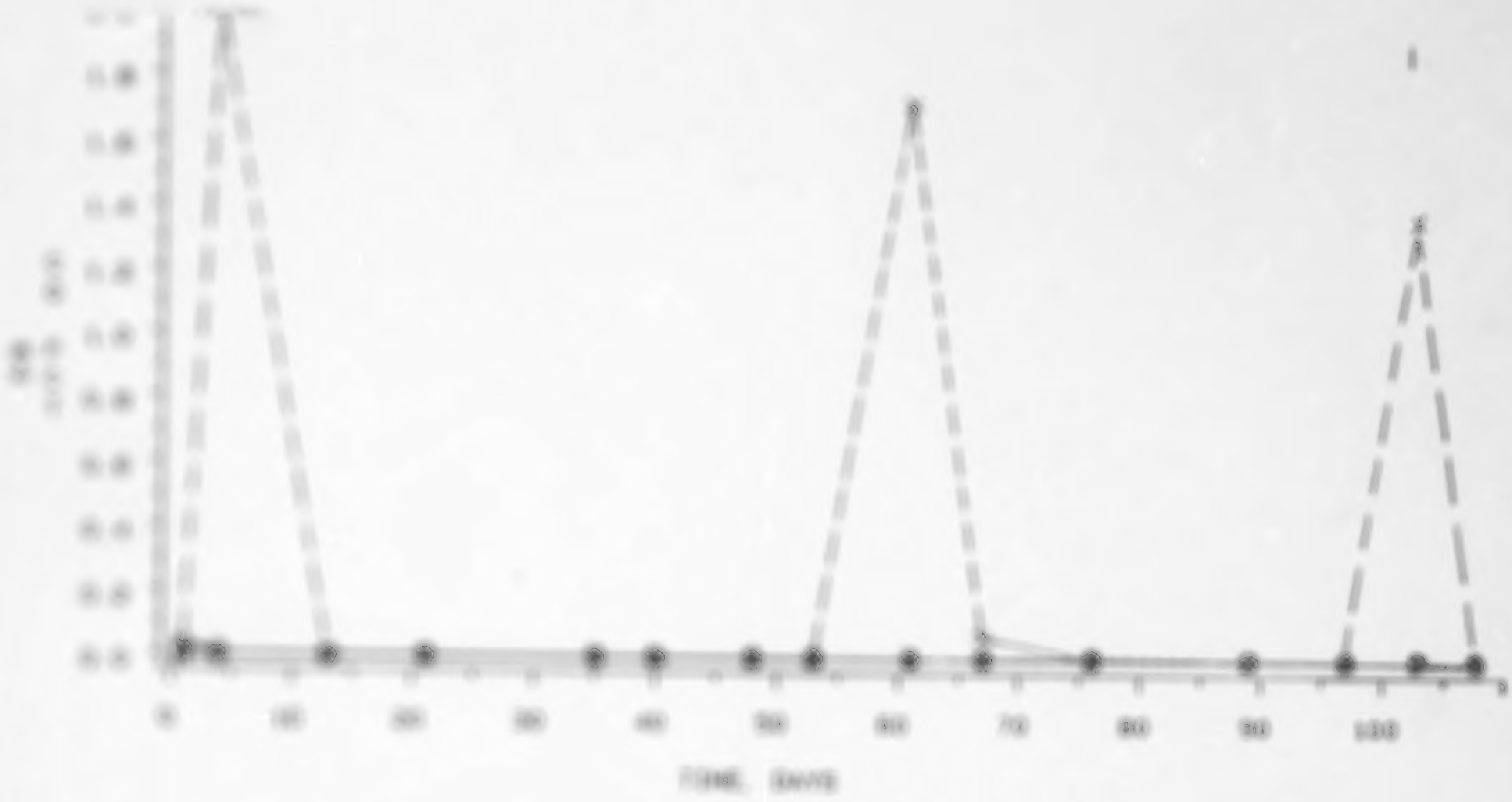
APPENDIX G

PLOTS OF CO-IDLE EMISSIONS VERSUS TIME
0-5 PERCENT SCALE

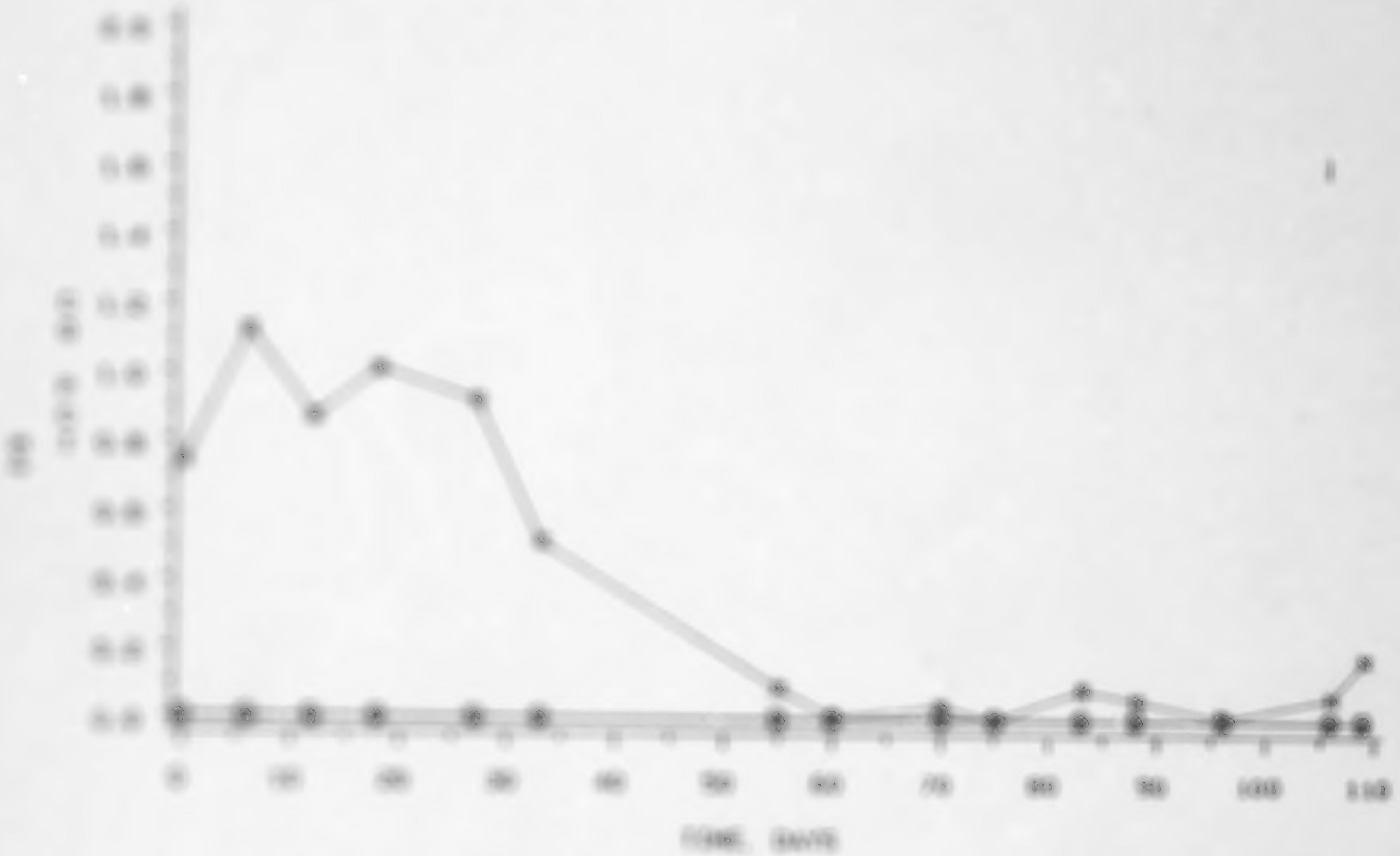
Figure G-	Vehicle No.	Vehicle Make and Model
1	01	Mercury Zephyr
2	02	Dodge Ramcharger
3	03	Oldsmobile Delta 88
4	04	Chevrolet Silverado
5	05	Honda Civic
6	06	Honda Accord
7	07	Jeep Cherokee
8	08	Peugeot 505
9	09	Volkswagen Golf
10	10	BMW 318i
11	11	Nissan Pulsar
12	12	Chevrolet Suburban
13	13	Ford Ranger
14	14	Oldsmobile Cutlass Supreme
15	15	Hyundai Excel GLS
16	16	Ford Thunderbird
17	17	Ford E-150 Van
18	18	Chevrolet Caprice Classic
19	19	Chevrolet Cavalier
20	20	Buick LeSabre
21	21	Volkswagen Scirocco
22	22	Chevrolet Astro Van
23	23	Nissan Pulsar
24	24	Buick Century
25	25	Volvo 240 DL

Legend for Plots

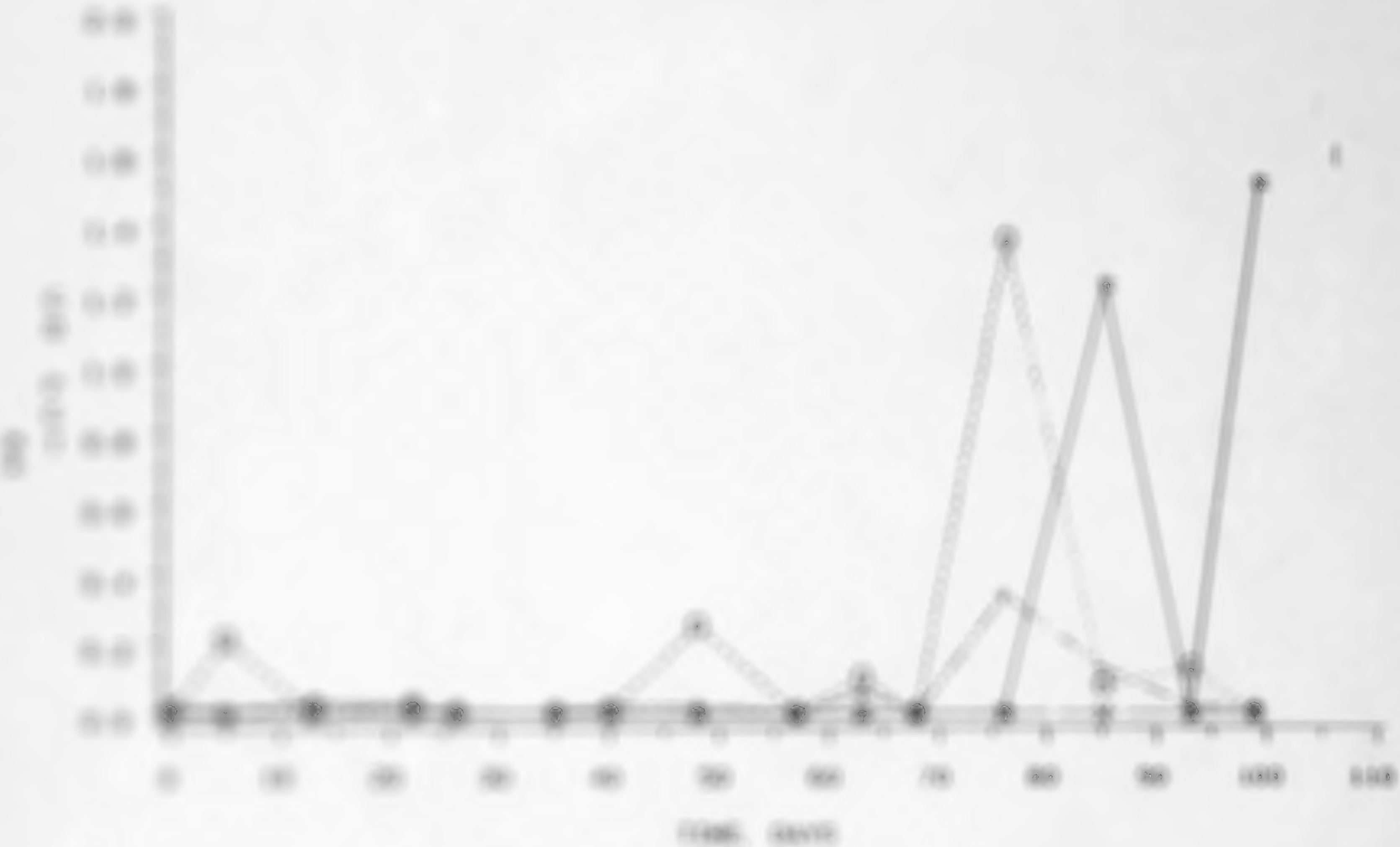
O - Before 1000 ppm conditioning - 1st
□ - After 1000 ppm conditioning - 1st
◇ - Before 1000 ppm conditioning - 2nd
△ - After 1000 ppm conditioning - 2nd


0
10
20
30
40
50
60
70
80
90
100
TIME, DAYS

[illegible]

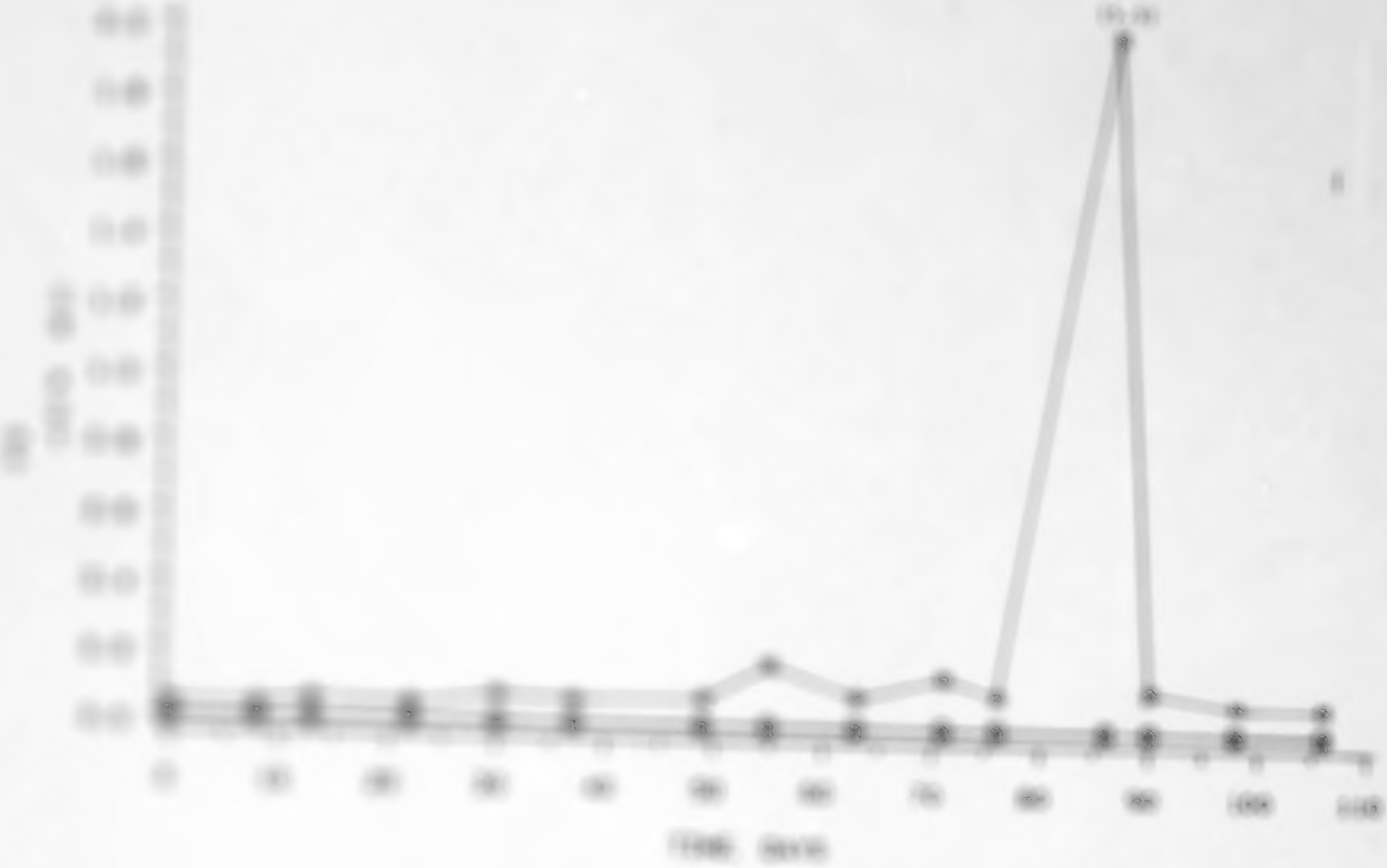

0
10
20
30
40
50
60
70
80
90
100
110
TIME, DAYS

[illegible]

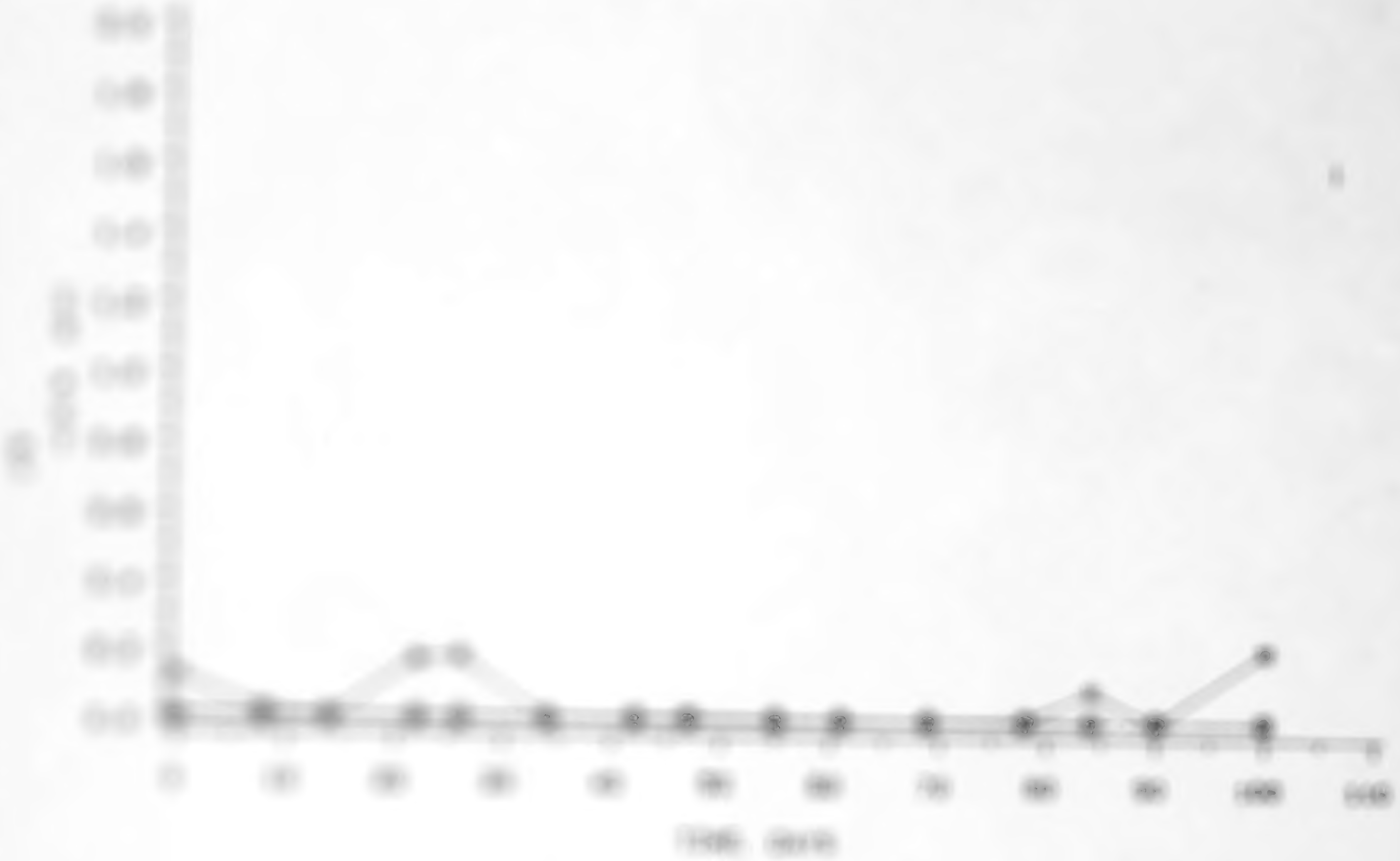

0
10
20
30
40
50
60
70
80
90
100
110
TIME, DAYS

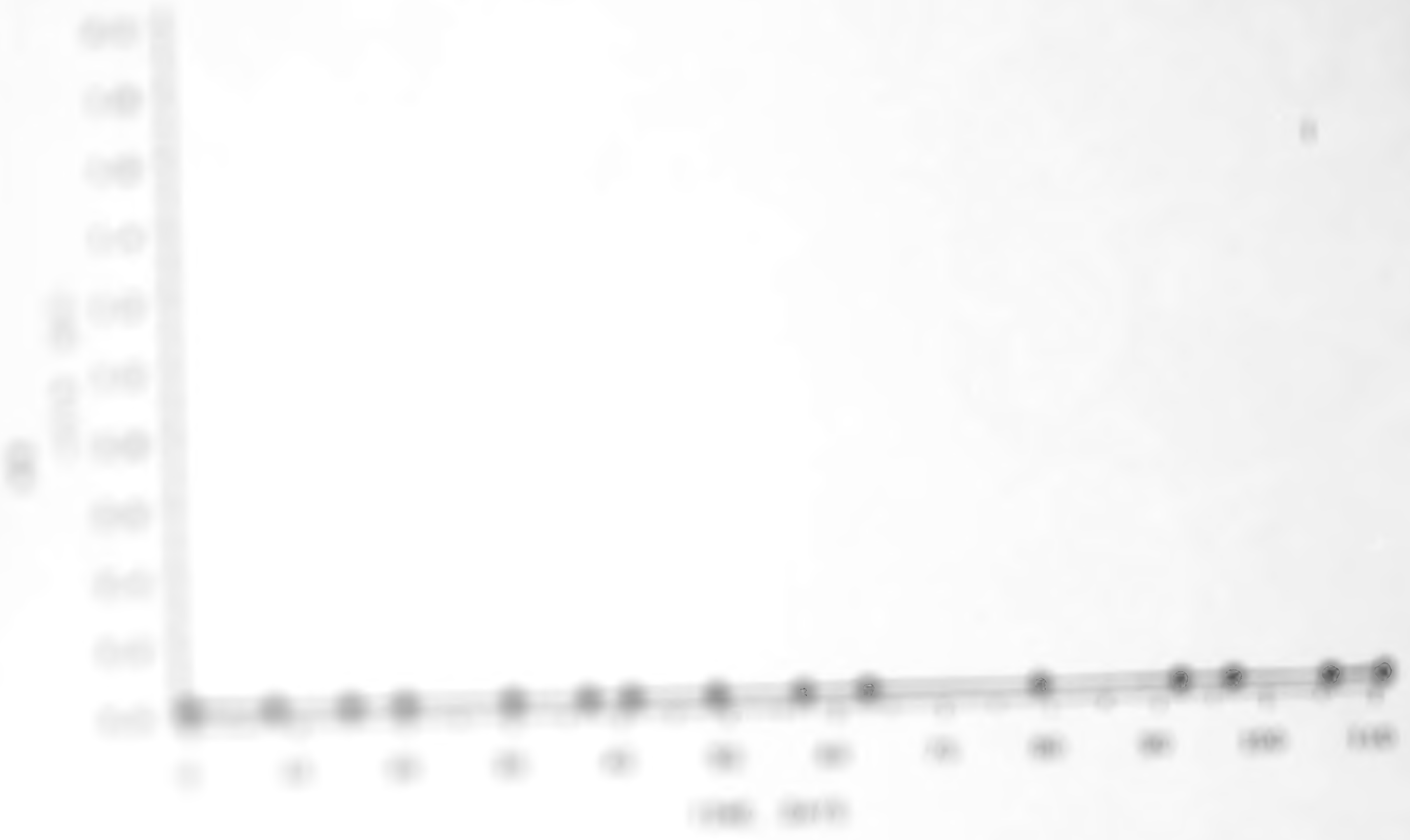
[illegible]

[illegible]


0
10
20
30
40
50
60
70
80
90
100
110
TIME, DAYS

[illegible]





[illegible]

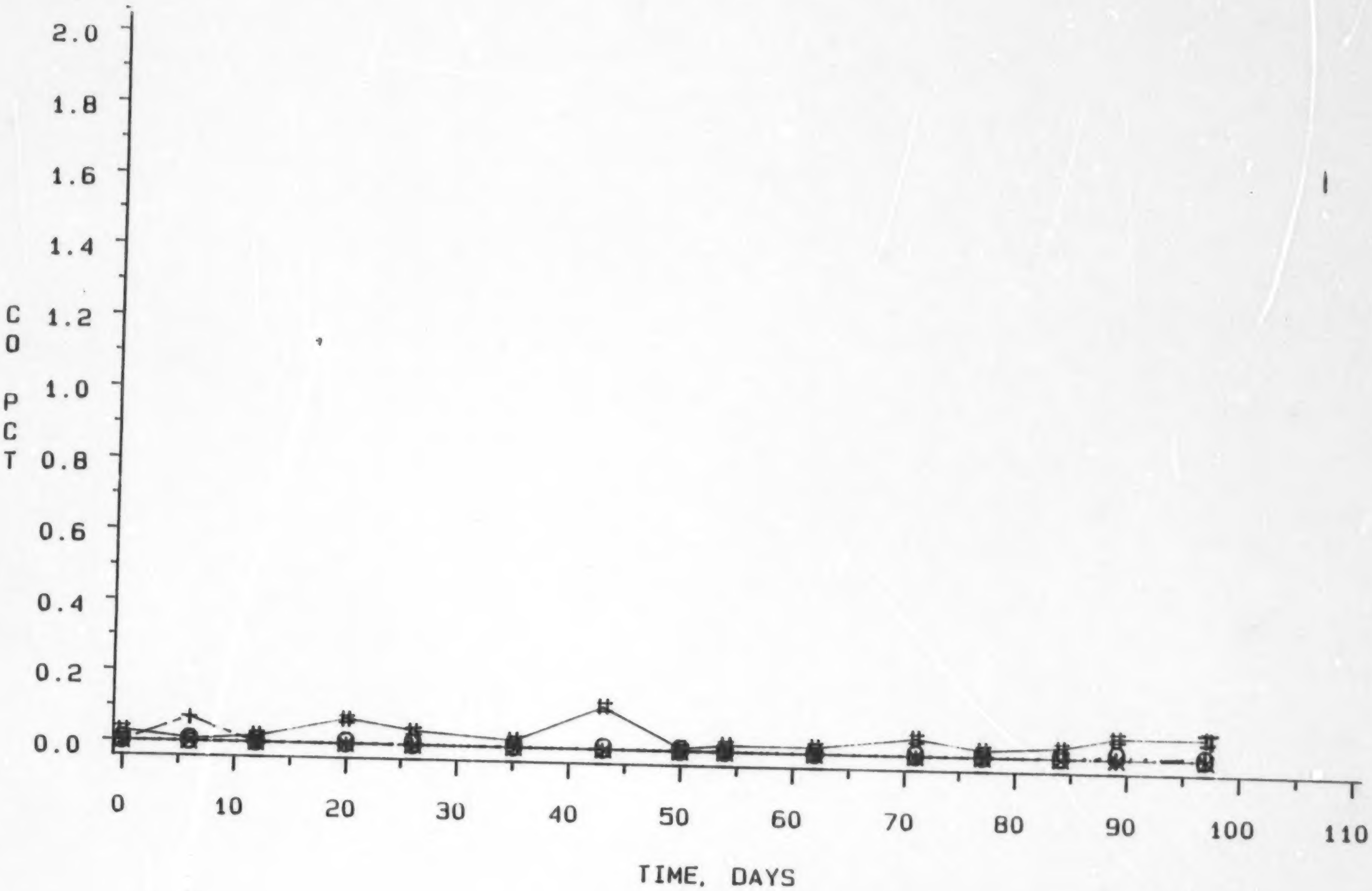
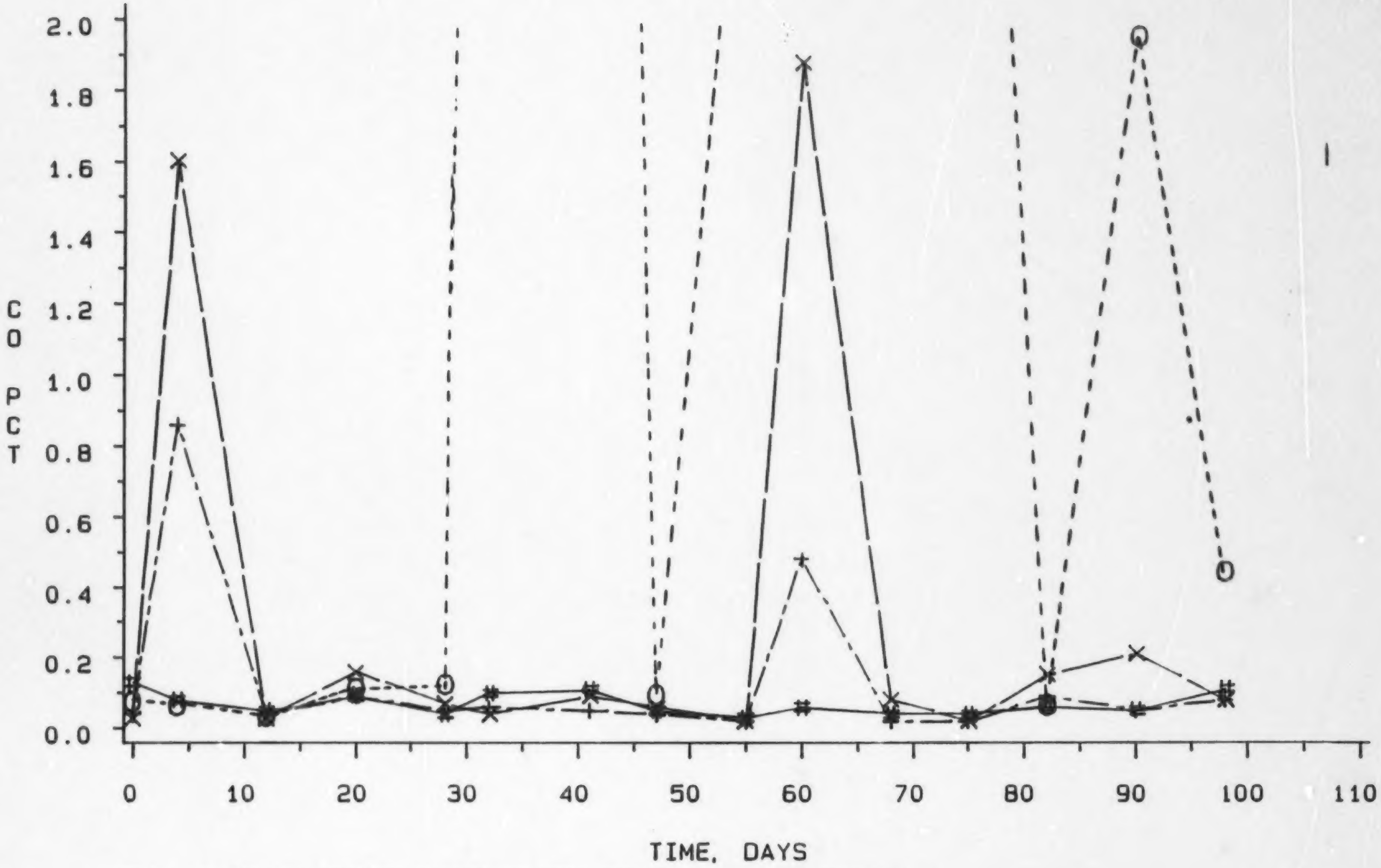


FIGURE K-8. VEHICLE 8 - 1982 PEUGEOT 505, CO-IDLE VS TIME



NOTE: 6 OBS HAD MISSING VALUES OR WERE OUT OF RANGE, SEE FIGURE L-1

FIGURE K-9. VEHICLE 9 - 1985 VOLKSWAGEN GOLF, CO-IDLE VS TIME

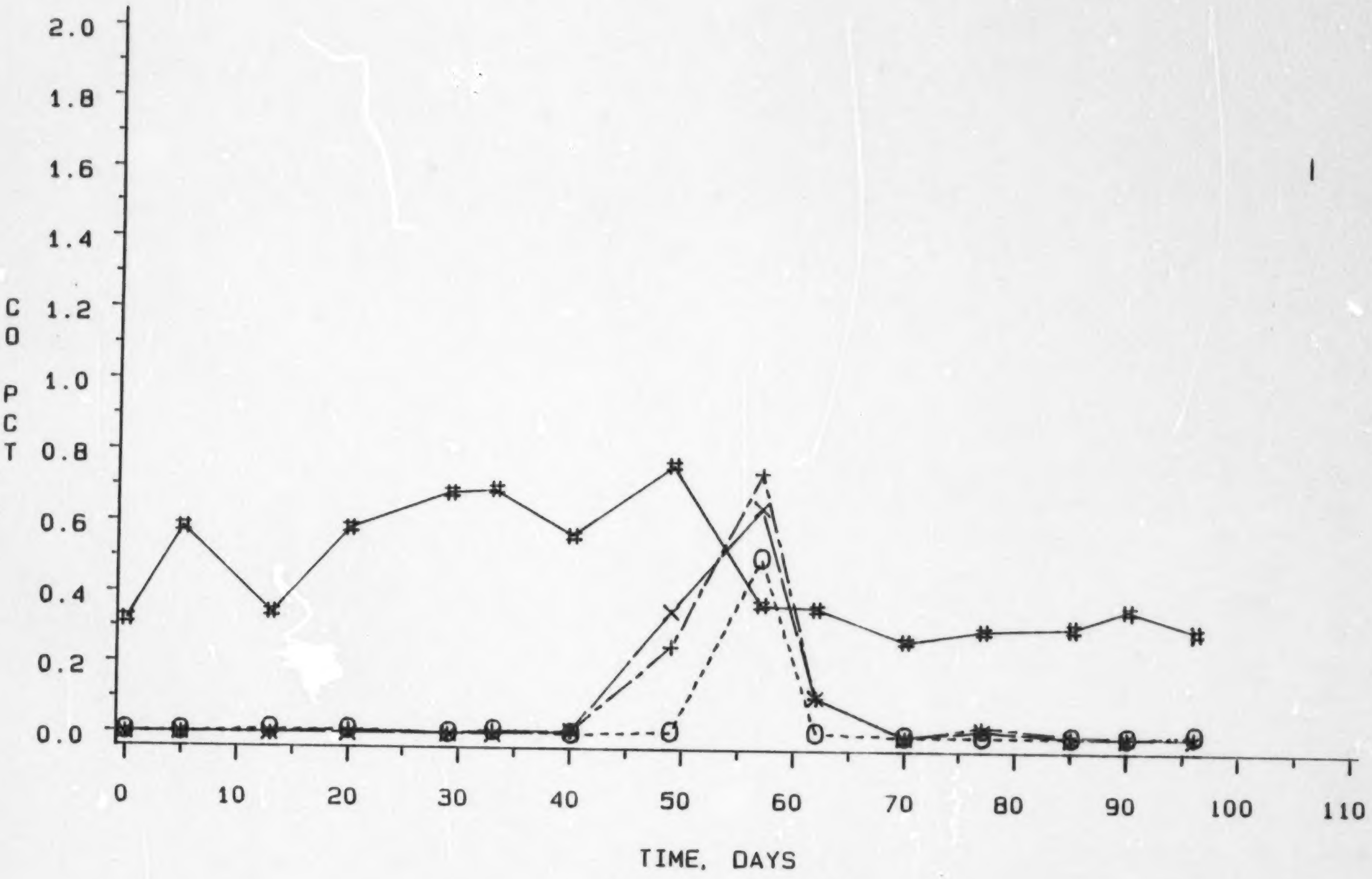


FIGURE K-10. VEHICLE 10 – 1985 BMW 318i, CO-IDLE VS TIME

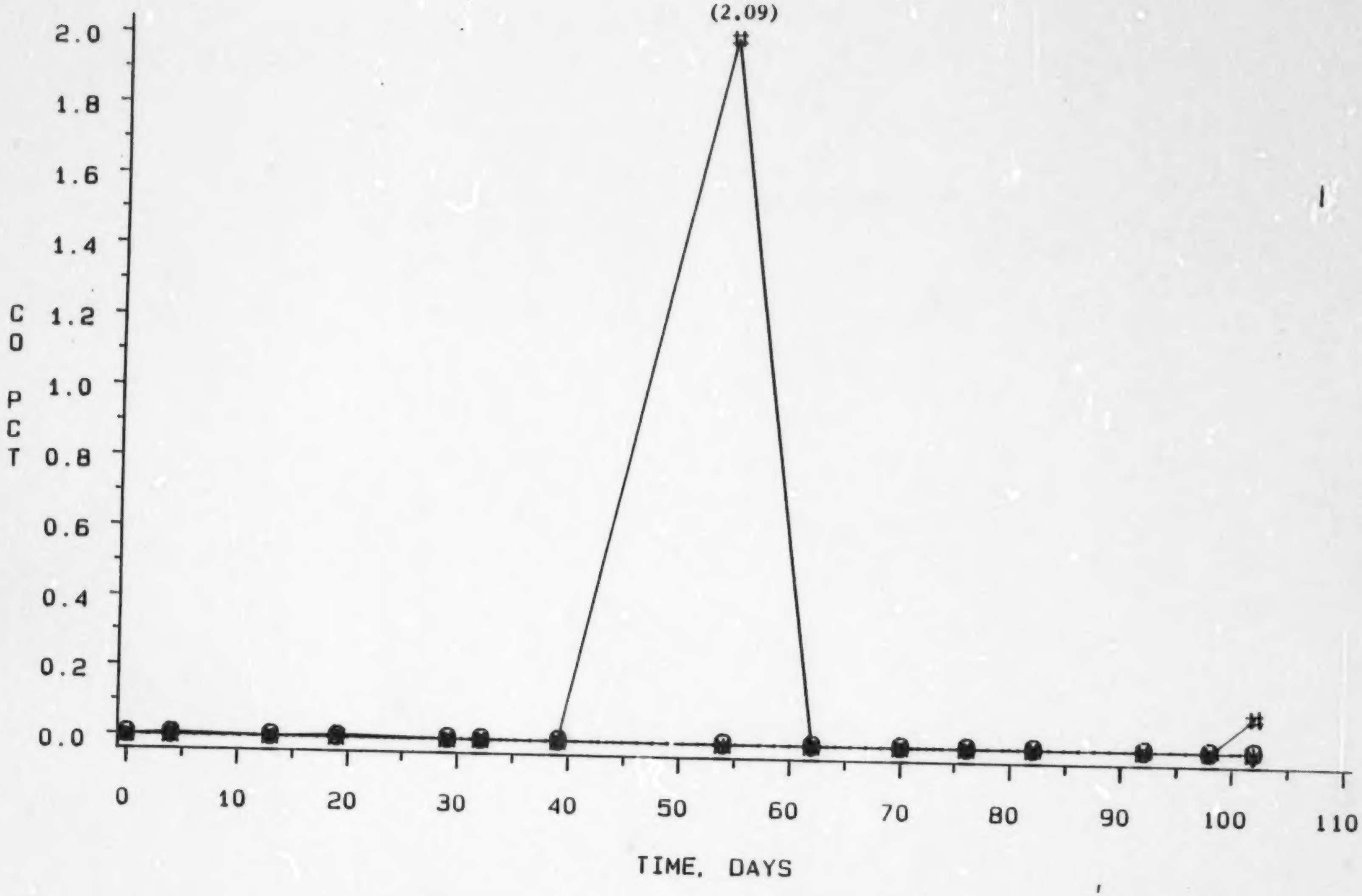


FIGURE K-11. VEHICLE 11 - 1986 NISSAN PULSAR, CO-IDLE VS TIME

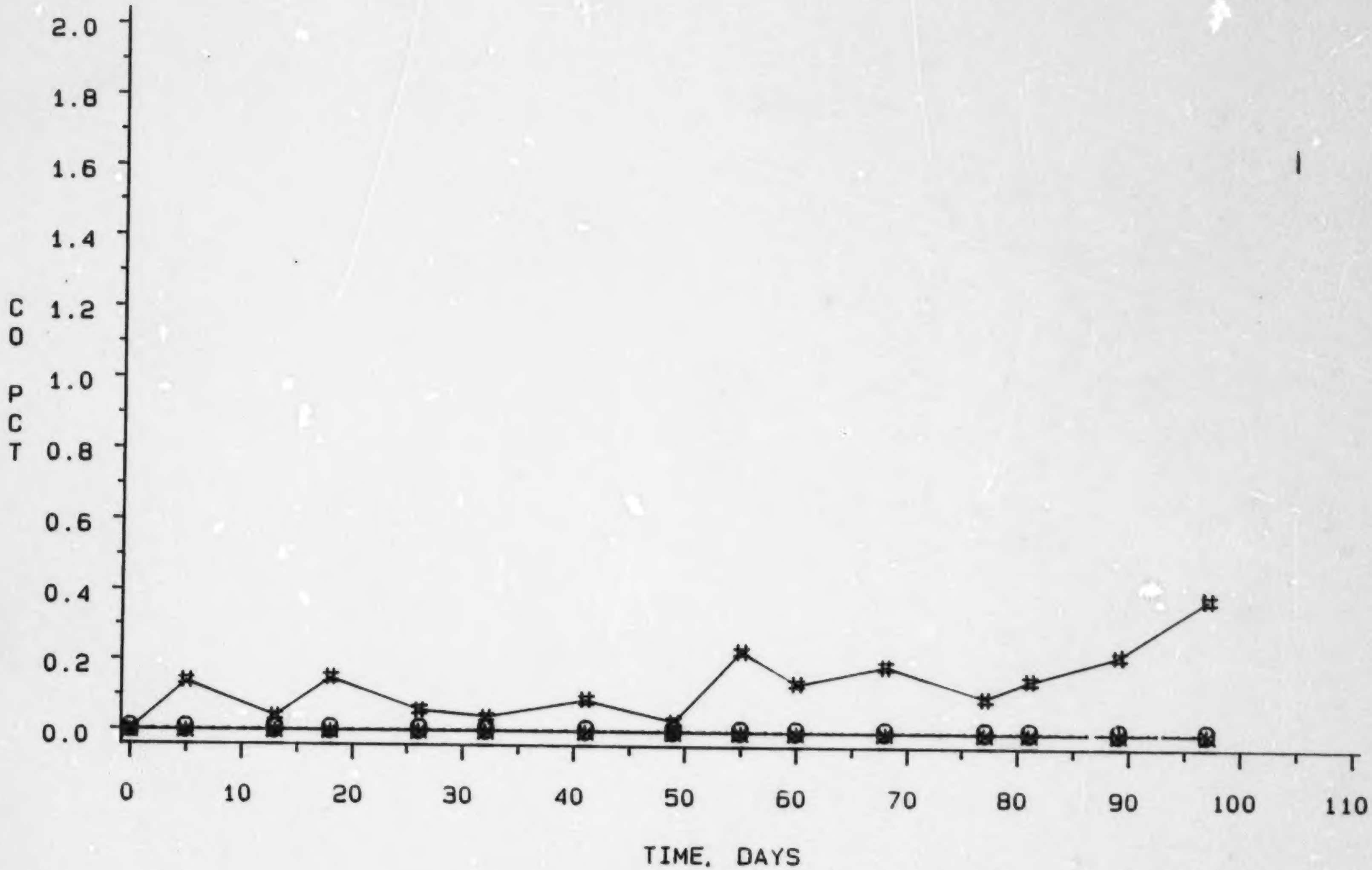


FIGURE K-12. VEHICLE 12 - 1984 CHEVROLET SUBURBAN, CO-IDLE VS TIME

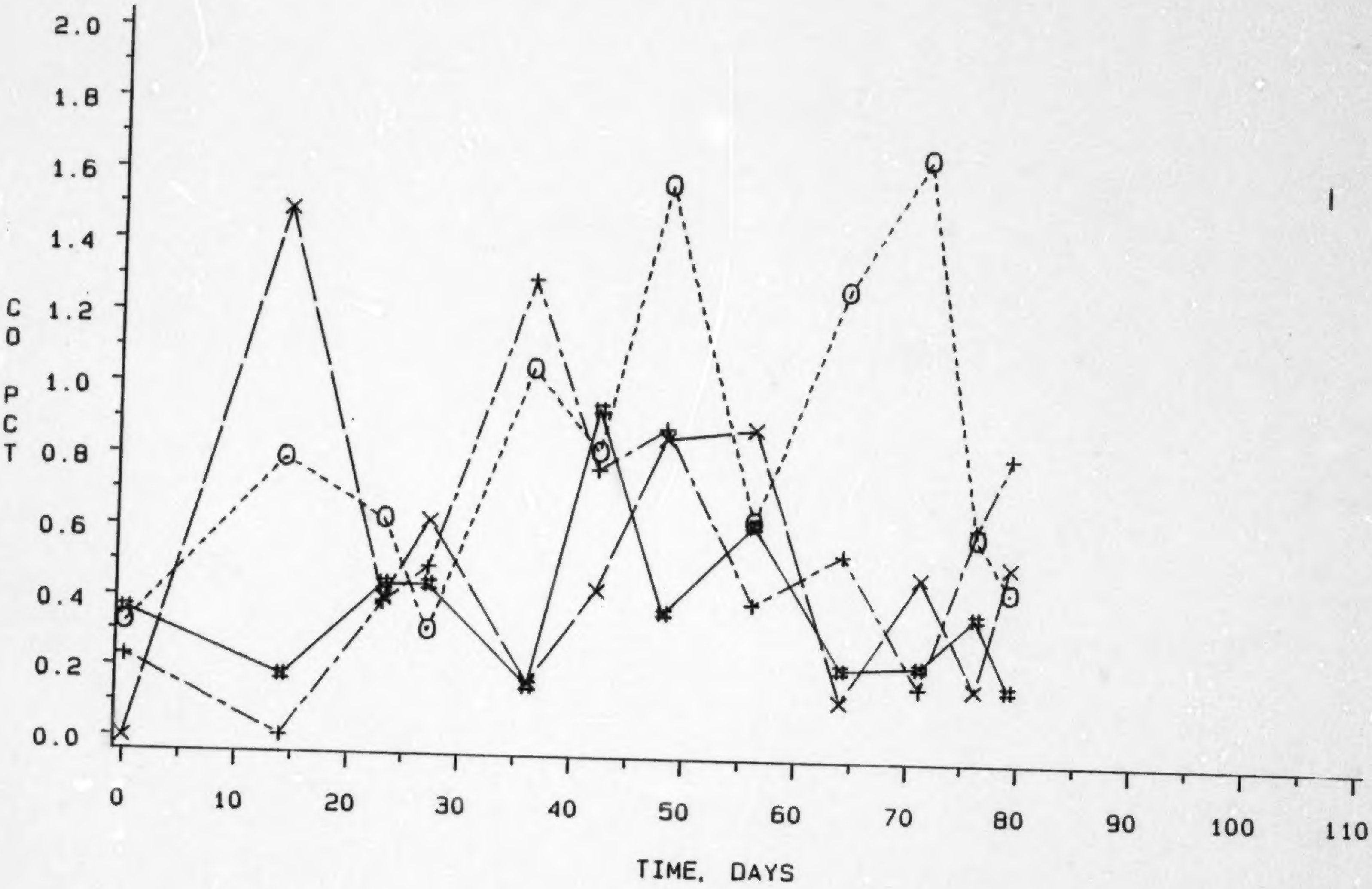


FIGURE K-13. VEHICLE 13 - 1985 FORD RANGER, CO-IDLE VS TIME

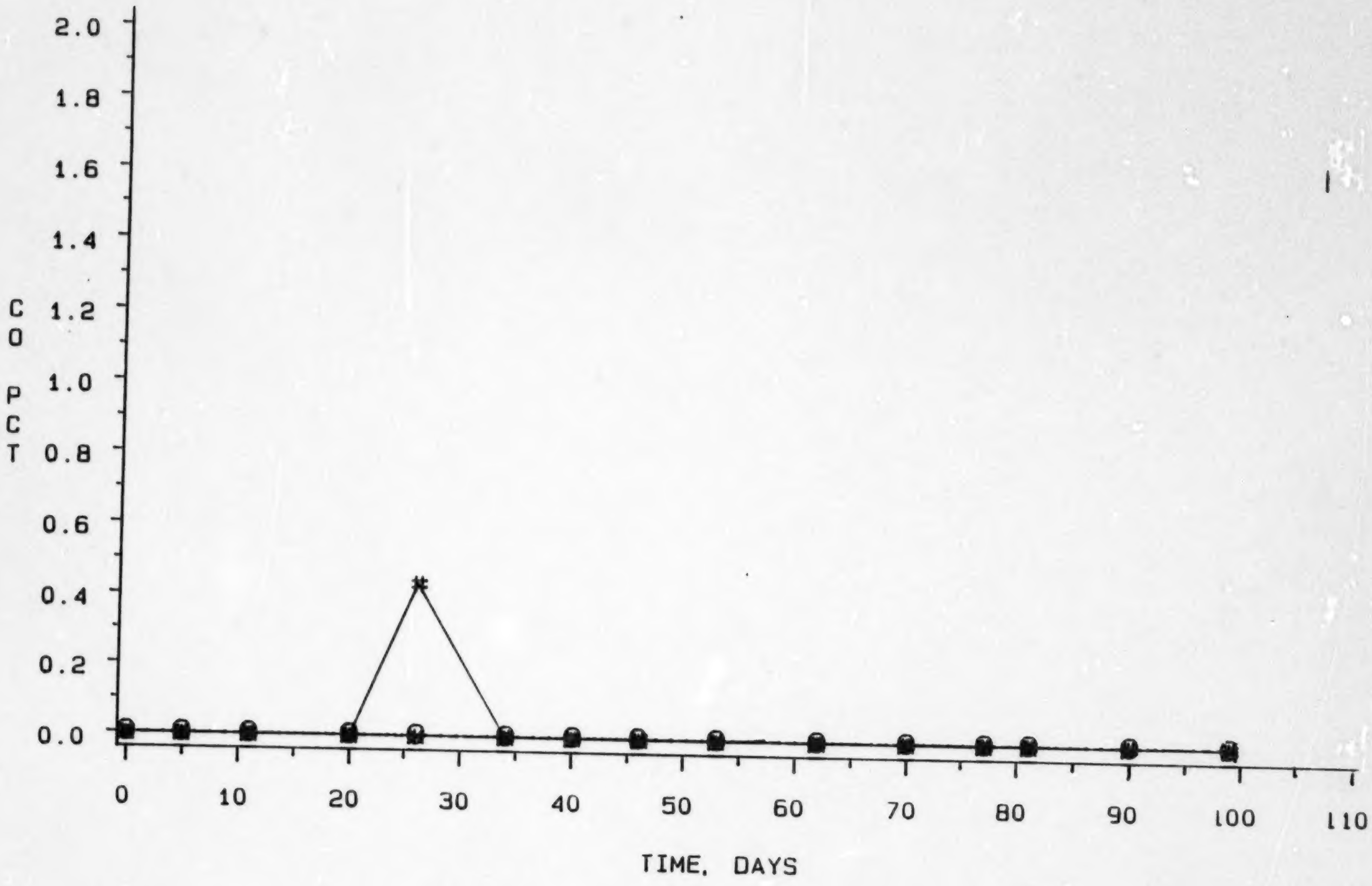


FIGURE K-14. VEHICLE 14 - 1986 OLDSMOBILE CUTLASS SUPREME, CO-IDLE VS TIME

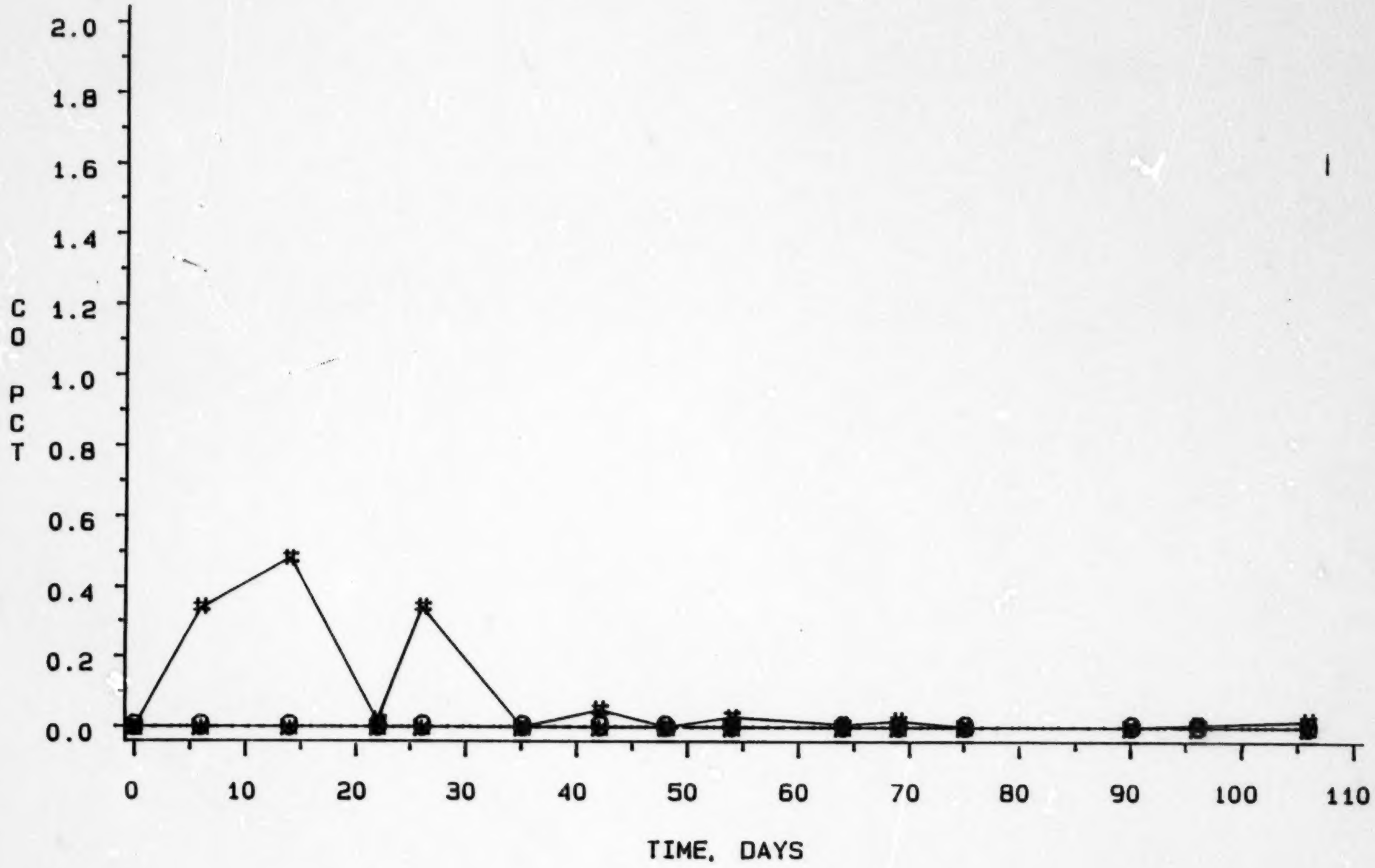


FIGURE K-15. VEHICLE 15 - 1987 HYUNDAI EXCEL GS, CO-IDLE VS TIME

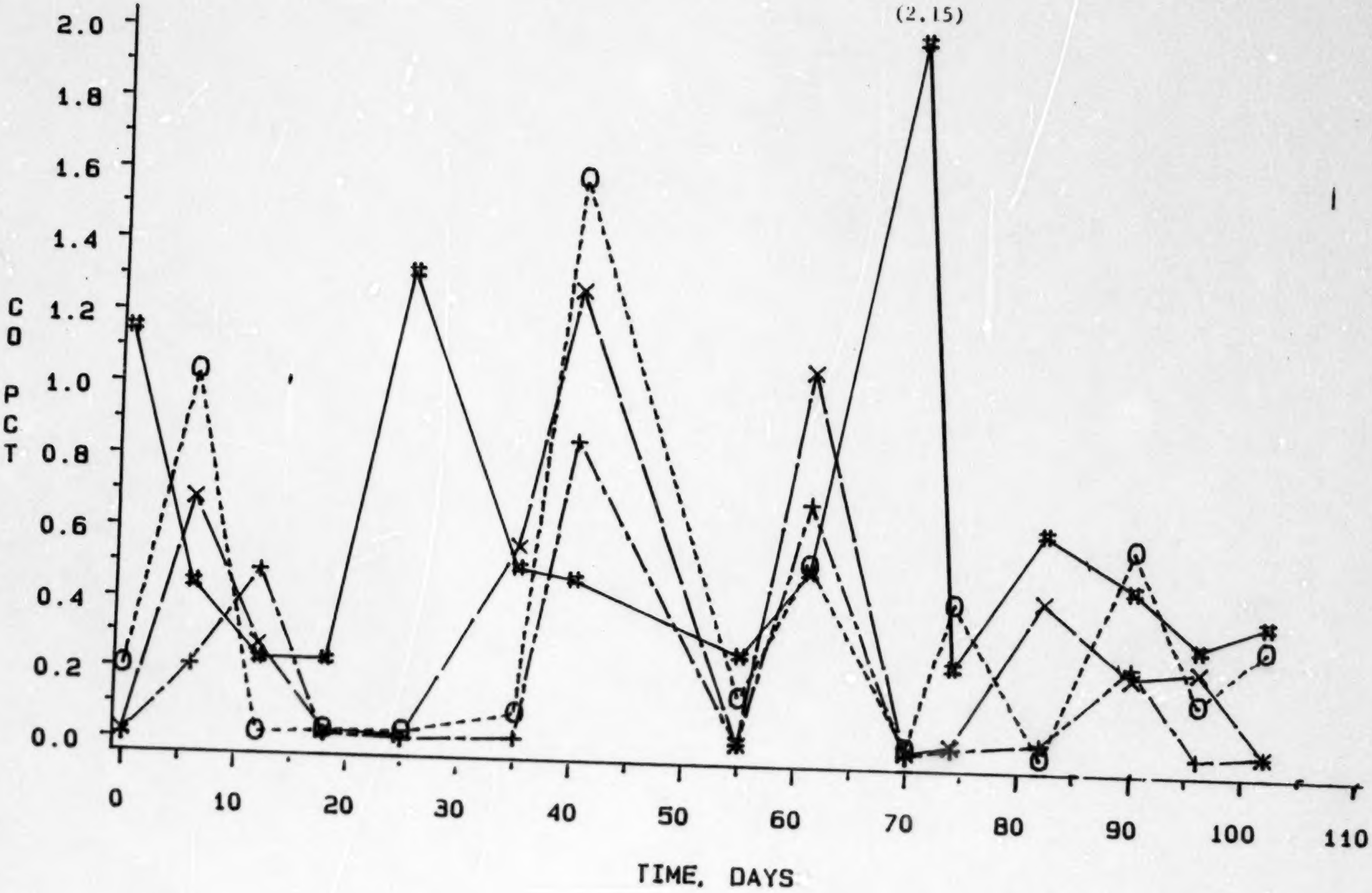
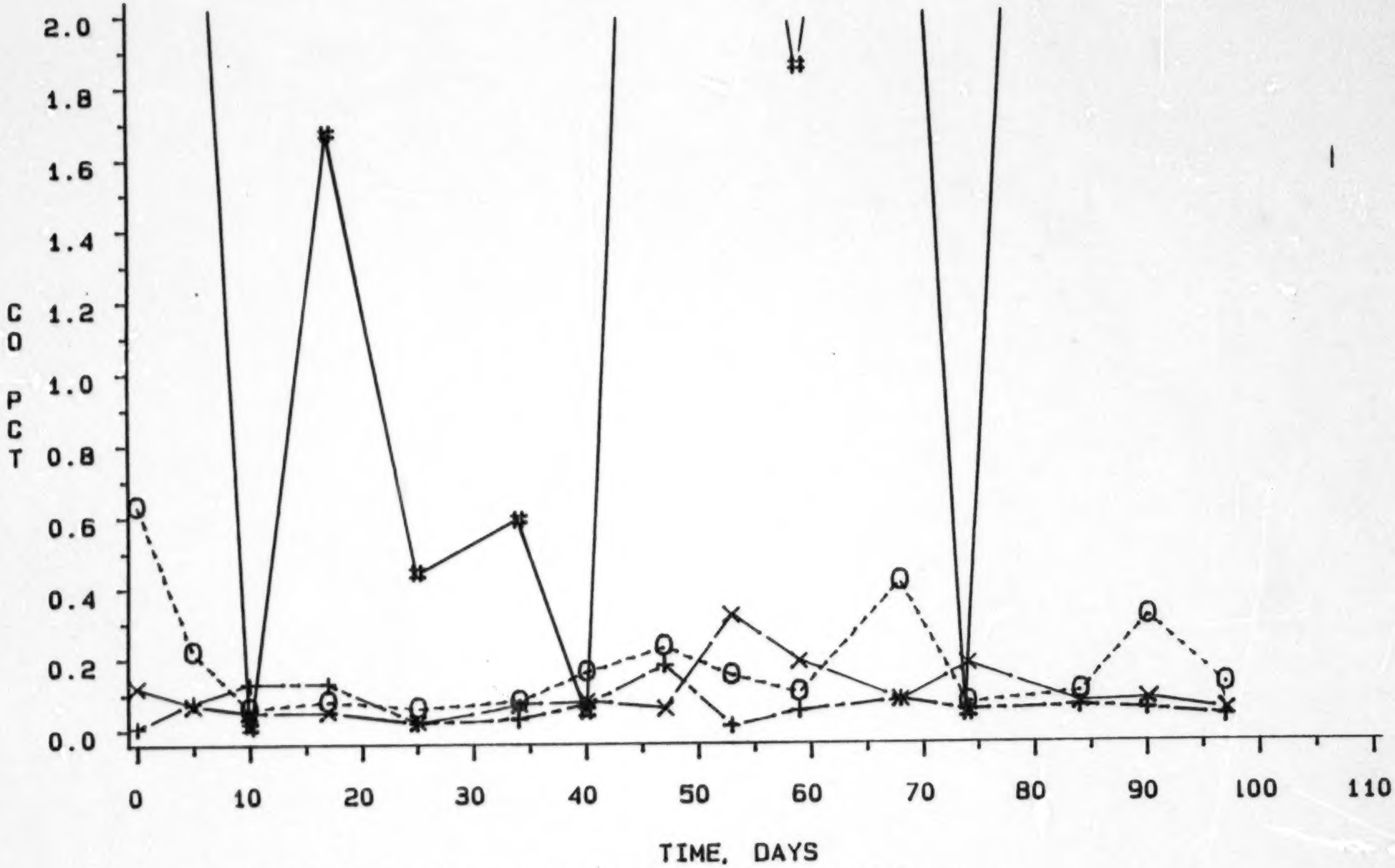


FIGURE K-16. VEHICLE 16 - 1986 FORD THUNDERBIRD, CO-IDLE VS TIME



NOTE: 8 OBS HAD MISSING VALUES OR WERE OUT OF RANGE, SEE FIGURE L-2

FIGURE K-17. VEHICLE 17 - 1984 FORD E-150, CO-IDLE VS TIME

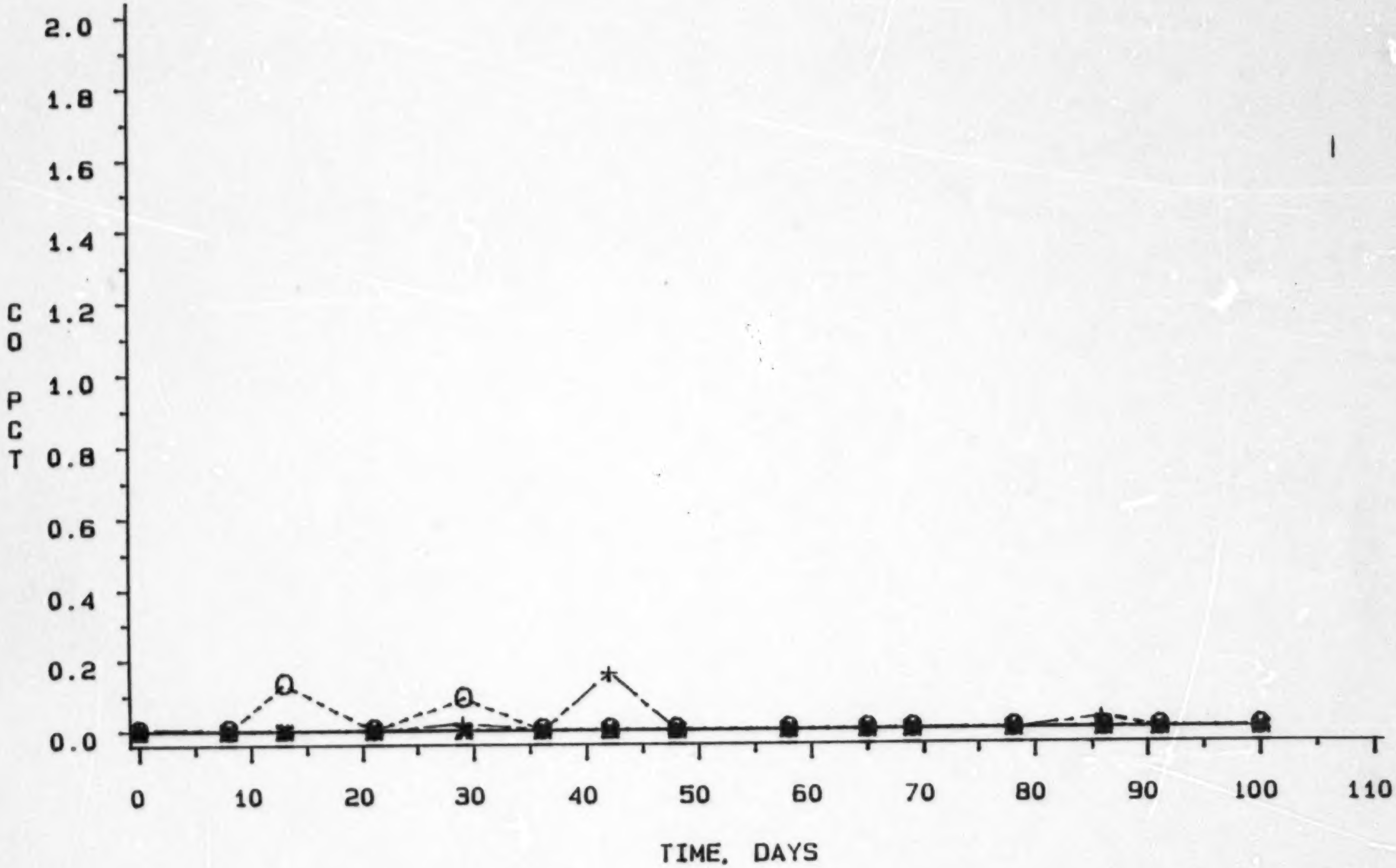


FIGURE K-18. VEHICLE 18 - 1984 CHEVROLET CAPRICE CLASSIC, CO-IDLE VS TIME

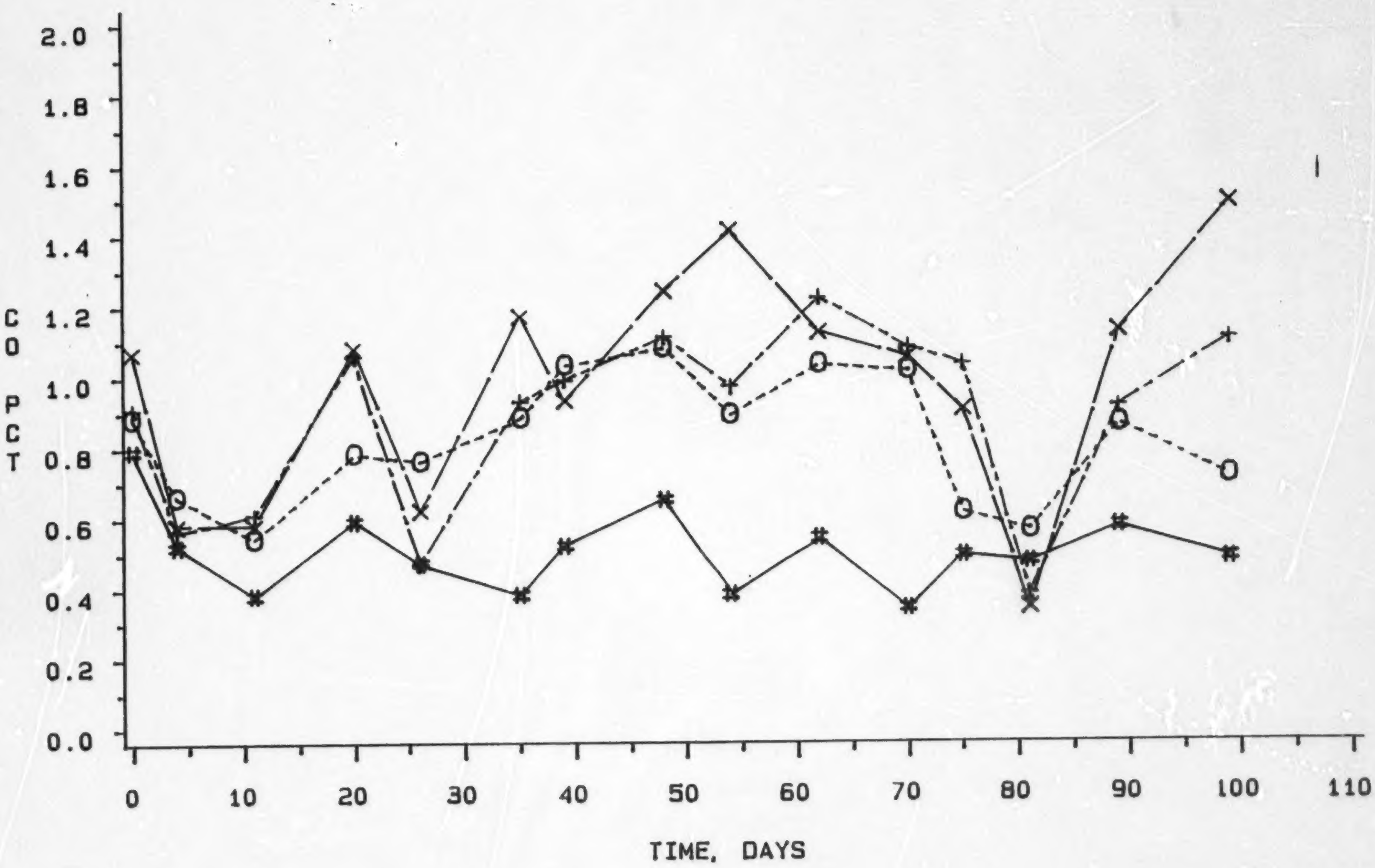


FIGURE K-19. VEHICLE 19 - 1985 CHEVROLET CAVALIER, CO-IDLE VS TIME

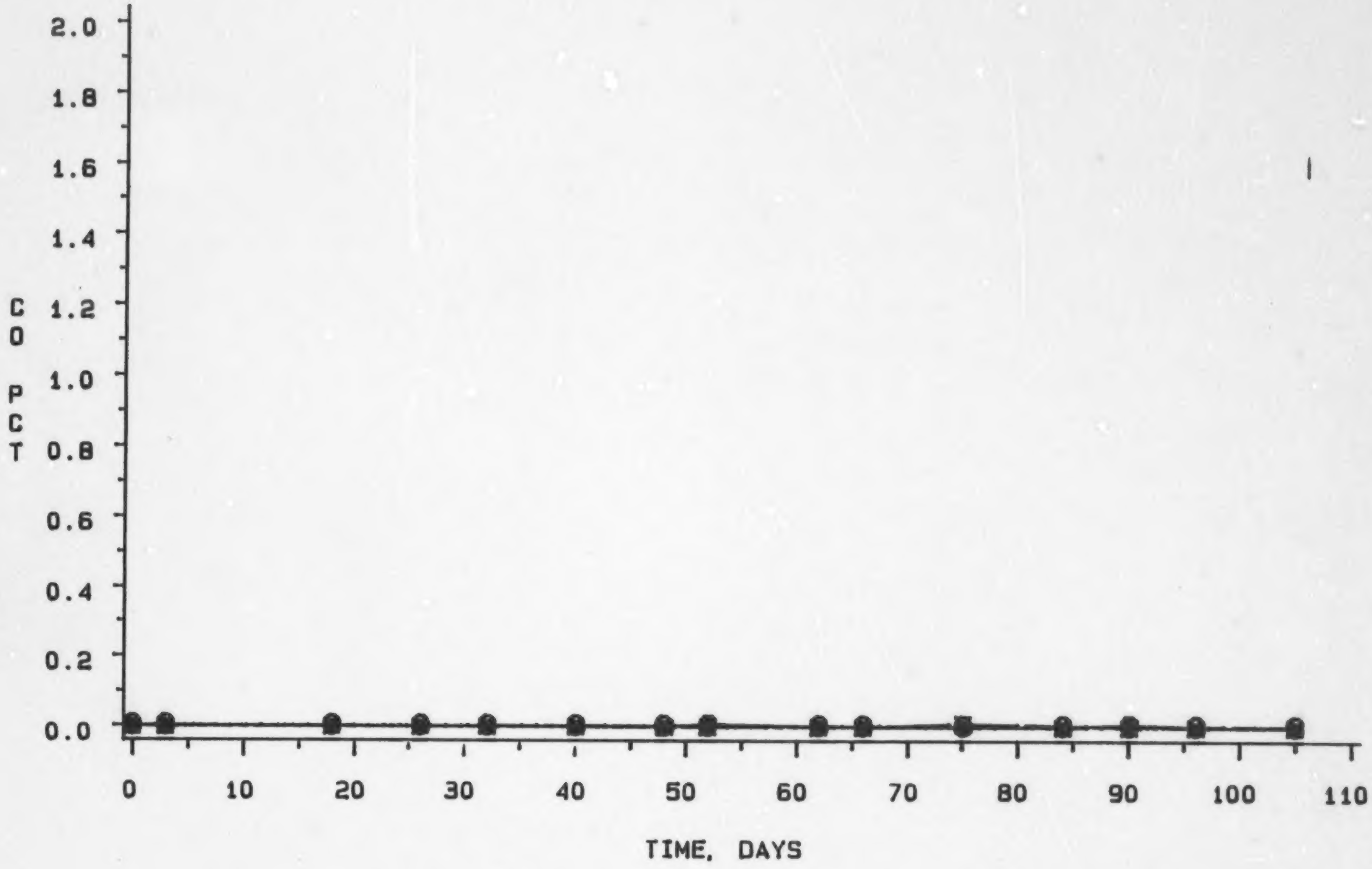


FIGURE K-20. VEHICLE 20 - 1987 BUICK LESABRE, CO-IDLE VS TIME

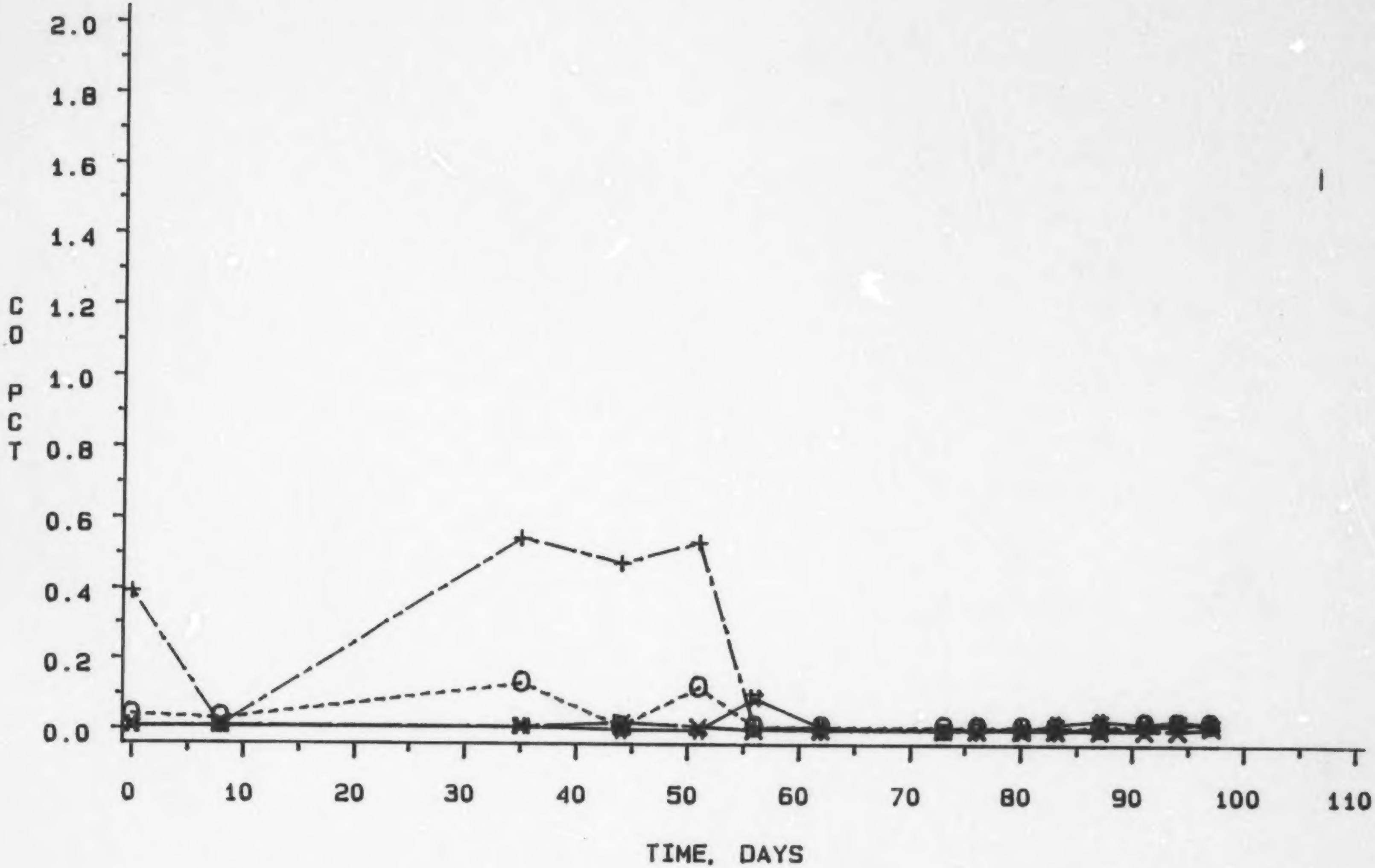


FIGURE K-21. VEHICLE 21 - 1982 VOLKSWAGEN SCIRROCO, CO-IDLE VS TIME

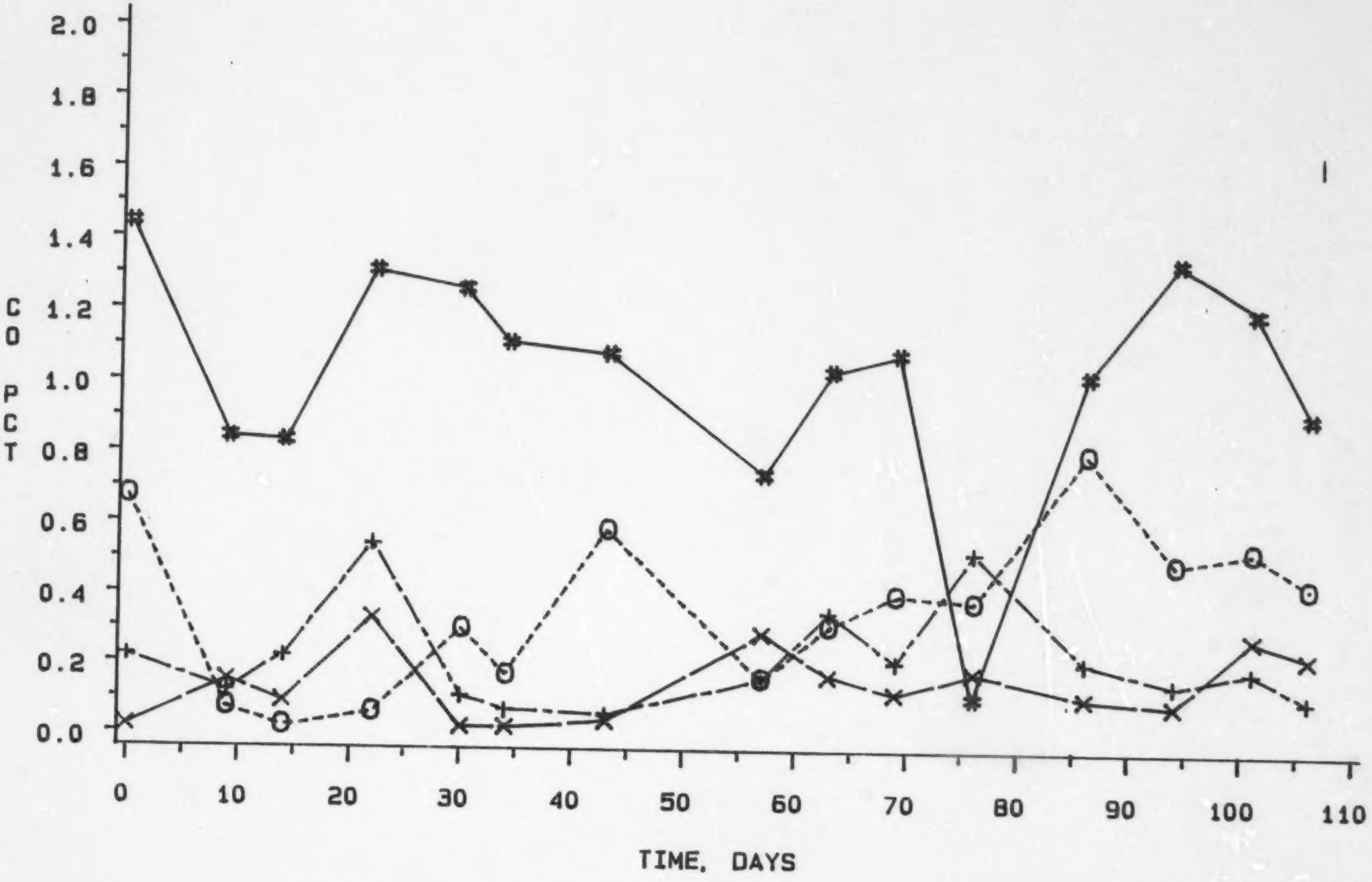


FIGURE K-22. VEHICLE 22 - 1987 CHEVROLET ASTRO, CO-IDLE VS TIME

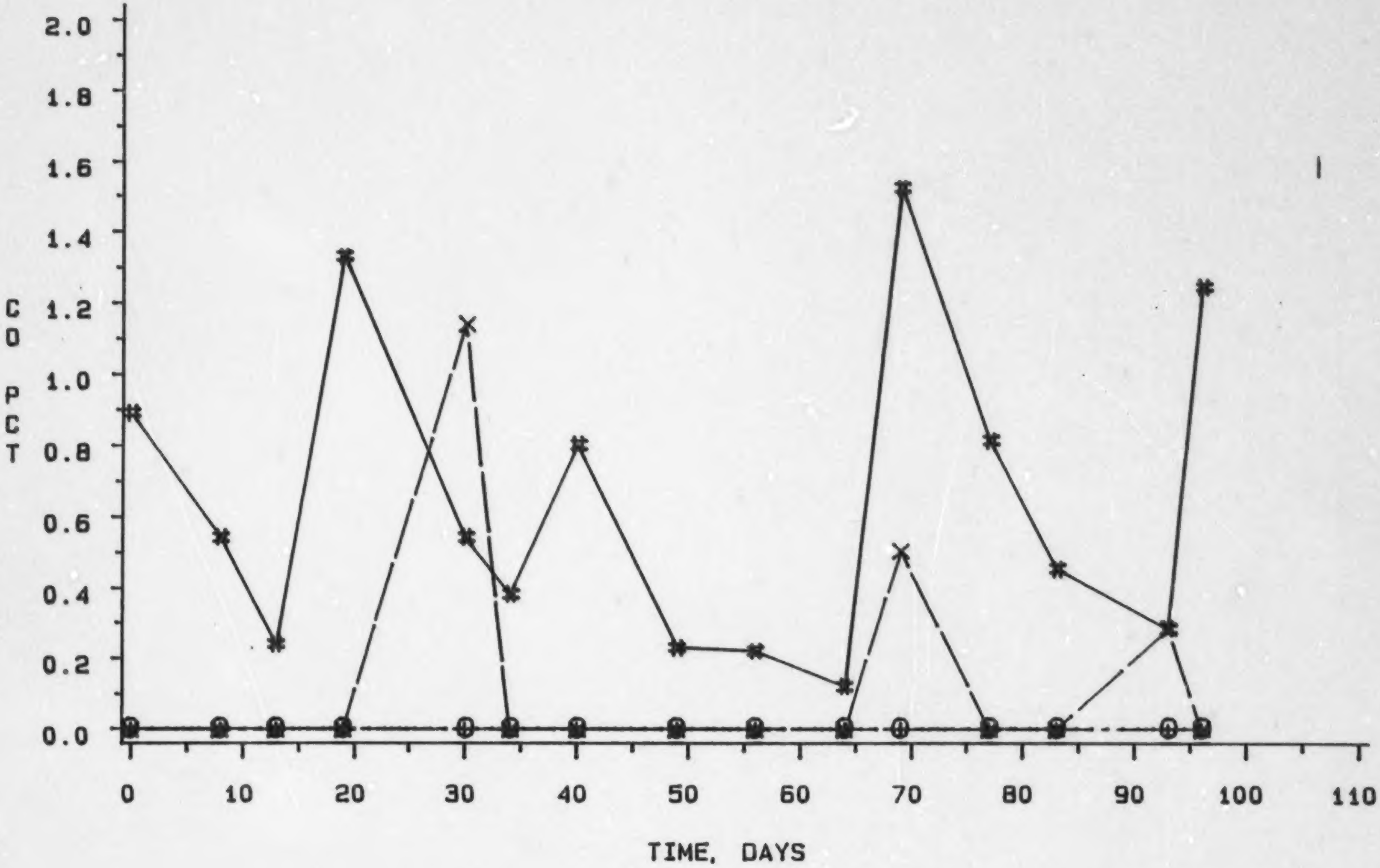


FIGURE K-23. VEHICLE 23 - 1987 NISSAN PULSAR, CO-IDLE VS TIME

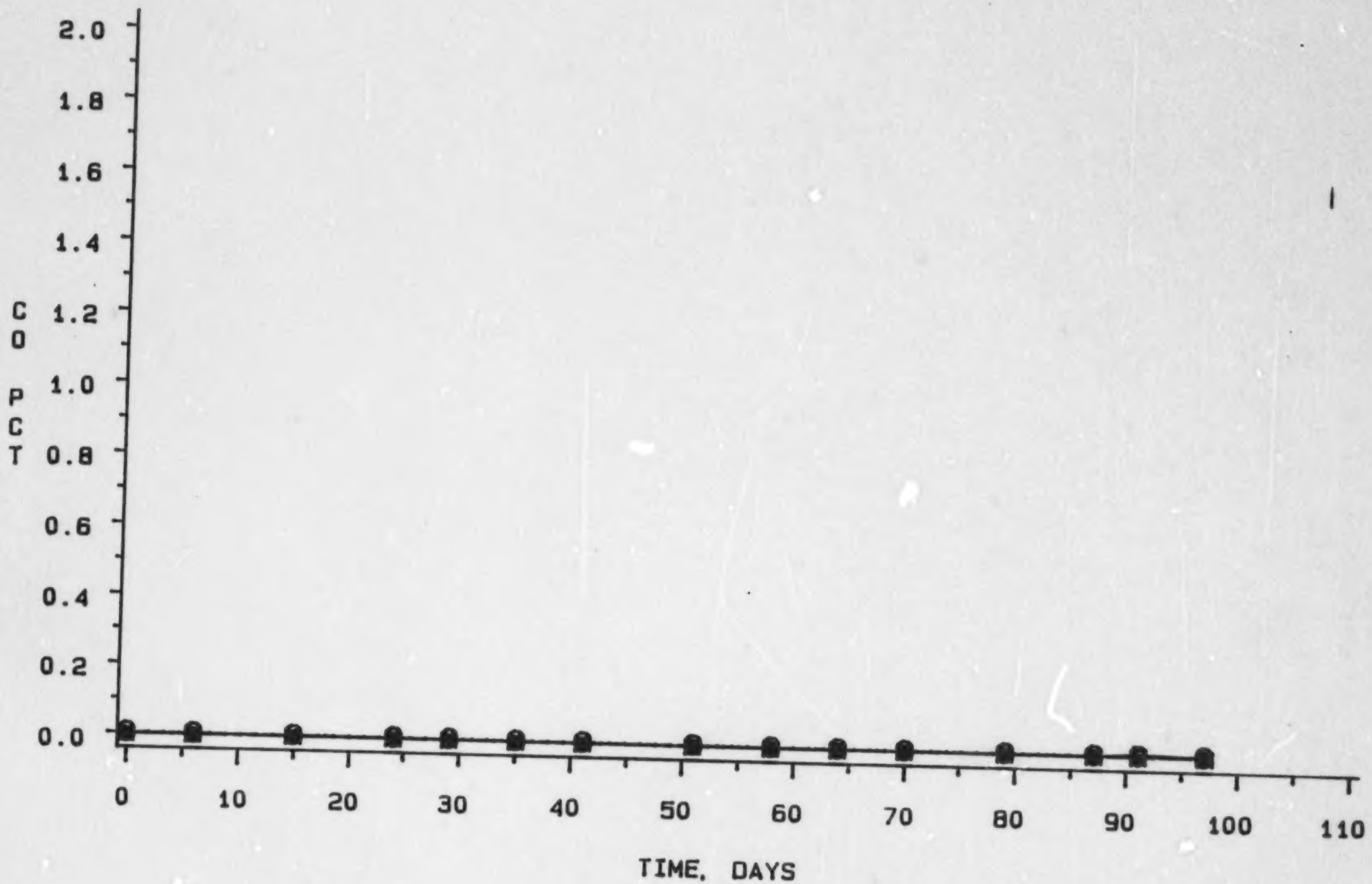


FIGURE K-24. VEHICLE 24 - 1986 BUICK CENTURY, CO-IDLE VS TIME

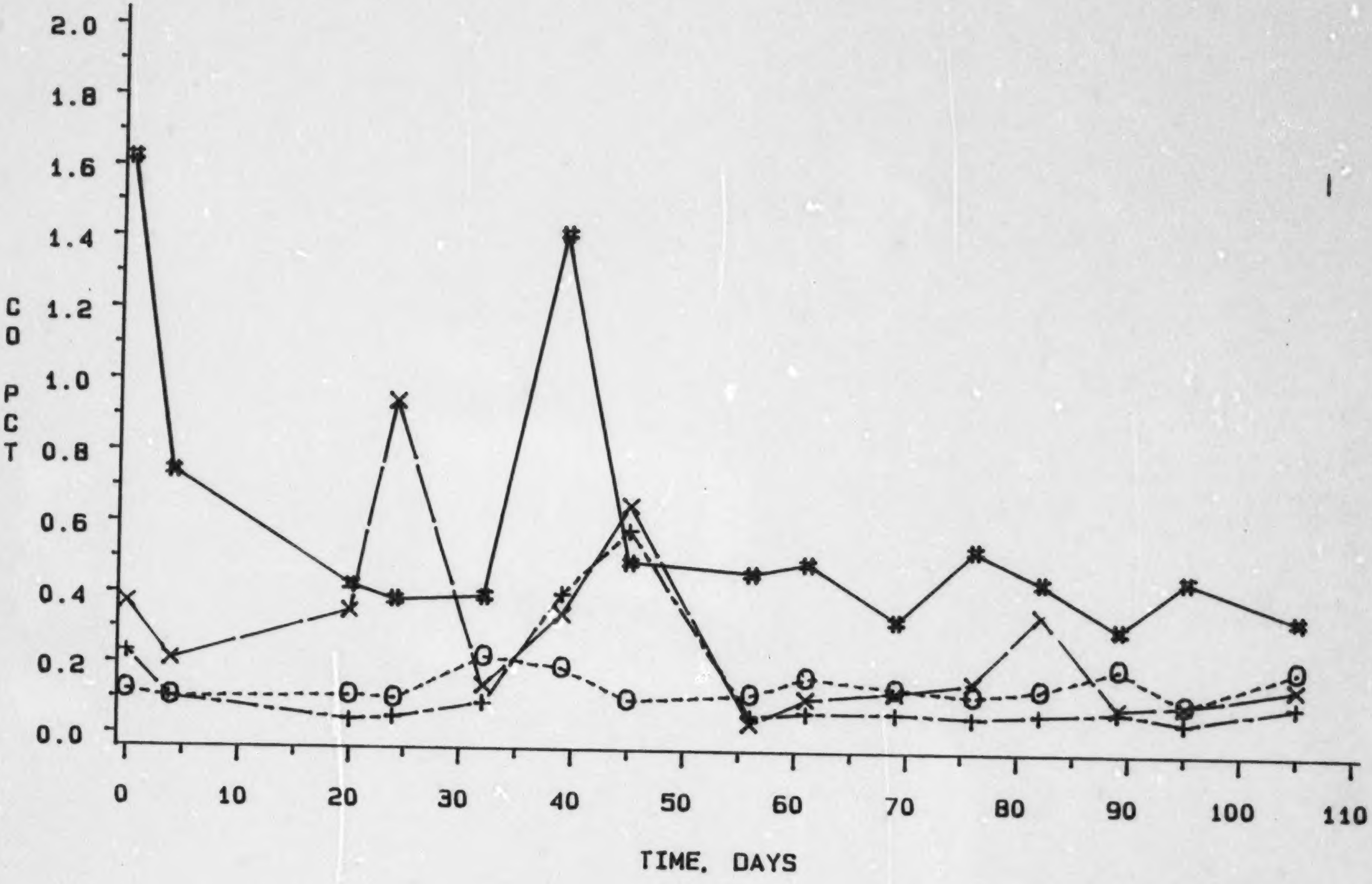


FIGURE K-25. VEHICLE 25 - 1982 VOLVO 240 DL, CO-IDLE VS TIME

APPENDIX L

REPLOTS OF CO-IDLE EMISSIONS VERSUS TIME
0-4 or 0-7 PERCENT SCALE

Figure L-	Vehicle No.	Vehicle Make and Model
1	09	Volkswagen Golf
2	17	Ford E-150 Van

Legend for Plots

x - Before 2500 rpm conditioning - am
+ - After 2500 rpm conditioning - am
# - Before 2500 rpm conditioning - pm
0 - After 2500 rpm conditioning - pm

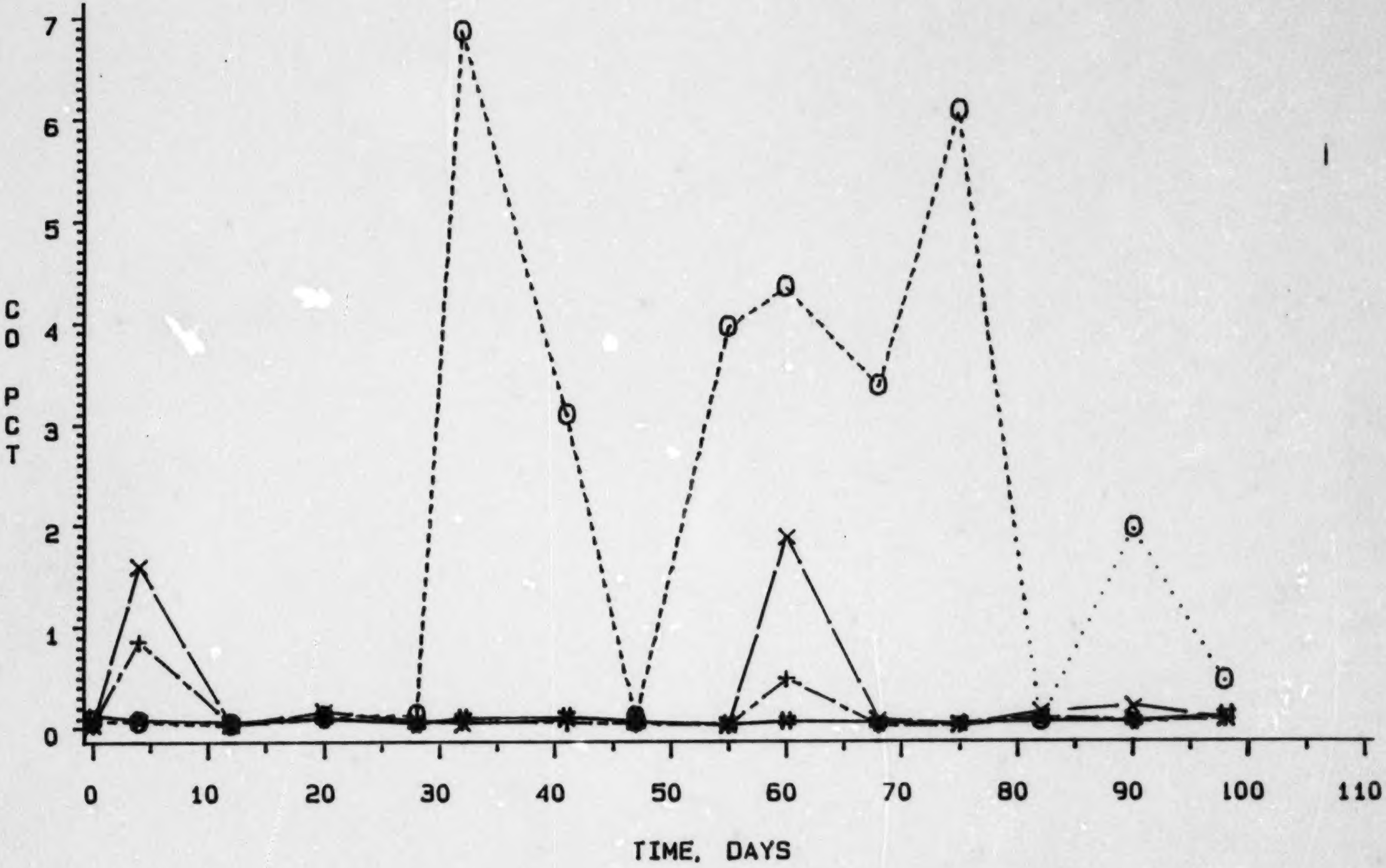


FIGURE L-1. VEHICLE 9 - 1985 VOLKSWAGEN GOLF, CO-IDLE VS TIME

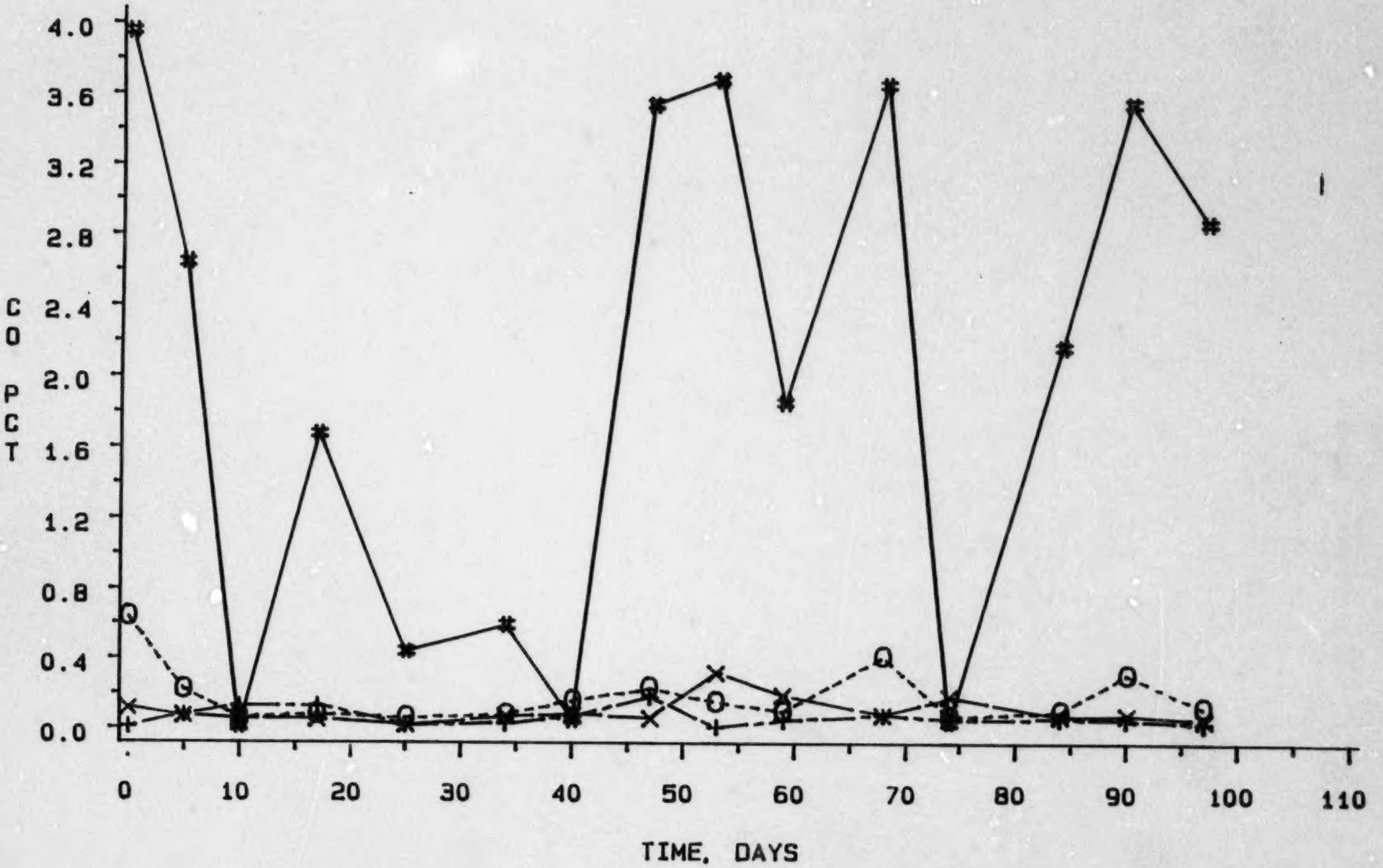


FIGURE L-2. VEHICLE 17- 1984 FORD E-150, CO-IDLE VS TIME